# The American Journal of Obstetrics and Gynecology

Vol. XII

graph) strain

guards

yles of

ire can

otomy dueted

place should

ould

all

oom

n a rom

as-

pa-

ics.

ate

St. Louis, September, 1926

No. 3

### **Original Communications**

THE ASSOCIATION OF CONGENITAL DIVERTICULA OF THE FALLOPIAN TUBE WITH TUBAL PREGNANCY\*

By F. P. McNalley, B.S., M.D., F.A.C.S., St. Louis, Mo.

(From the Department of Obstetrics, Washington University School of Medicine)

A LTHOUGH congenital diverticula of the tube, lined by folds of tubal epithelium and separated by muscle from the main lumen, have been frequently suggested as occasional factors in the development of tubal pregnancy, the frequency of their occurrence and their importance in the etiology of tubal pregnancy has not been widely emphasized.

These, of course, explain the imbedding of the ovum only as a result of actual mechanical retention. It is, however, debatable whether this alone can be responsible and one should not discuss tubal pregnancy without at least mentioning the possible rôle played by some peculiar receptivity of the tube, making the development of the ovum possible. Careful study of some cases in the human subject has failed to show any obstruction and in addition experimental work causing obstruction has failed to produce tubal pregnancy. This work has been chiefly done by Loeb, who ligated the tubes and failed to observe any ova develop. By placing the ligature so that a minute amount of uterine mucosa remained distal to the ligature, however, he observed implantation at this point. He concludes from this that besides the obstruction, the factor of a suitable soil must be present, and that this is not present in guinea pigs but probably is in the human tube. He has also shown that in exceptional cases it is possible for the ovum to fix itself in the peritoneal surface of the uterus and to undergo the first stages of development without the aid of a decidual reaction on the part of the host tissue. His experiments also show that obstruction is an important factor.

<sup>\*</sup>Read before the Washington University Medical Society, February 8, 1926.

Note: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

There are many conditions which would account for obstruction, but the ones of particular interest are blind pockets, either congenital or acquired as the result of inflammation. The latter have been generally believed to be the most important and are the most common lesions reported by previous investigators, notably Hoehne, who believes adhesions between folds of the mucosa or the invasion of tube wall for short distances by tubal epithelium, the so-called salpingitis isthmica nodosa, caused by previous inflammation, are the most important factors.

Opitz also believes this is the most frequent cause of tubal pregnancy. This same opinion is held by C. D. Williams, who says that false diverticula formed by adhesions of the folds of mucosa as the result of inflammatory processes cause 95 to 98 per cent of the cases, and that true diverticula are the rarest of tubal malformations.

J. W. Williams in 1891, called attention to diverticula from the lumen extending into the wall of the tube, reaching almost to the peritoneal surface, which he said may bear a causal relation to tubal pregnancy.

Landau and Rheinstein, also in 1891, reported a case of six weeks' pregnancy in a diverticulum, basing their diagnosis upon the fact that the ovum was close under the peritoneum and the tube lumen was almost unchanged.

Henrotin and Herzog reported a similar case.

Rubin demonstrated an ovum fourteen to fifteen days old in the isthmus of a tube associated with a diverticulum but not the cause of it, because the ovum was imbedded distal to it and at the site of a muscular spur which narrowed the lumen.

In 1924, Schoenholz raised the question of whether changes which have been considered inflammatory are not really congenital, namely, the fusion of folds of mucosa and also salpingitis isthmica nodosa. He believes there are two types of deformities resulting from a disturbance of development during embryonic life. 1. Those where an invasion of the mucosa occurs into the musculature, partly with folds and partly without, the true diverticula. 2. Such defects as are characterized by a division of the free lumen into separate spaces by folds of mucosa.

Mickovitch found anomalies, either congenital or acquired, in all of his cases. There were accessorial passages or spaces adjacent to the tube, and it was nearly always possible to prove that the imbedding of the ovum originated in these accessorial passages. He could also nearly always find the communication of the passage with the main lumen. These passages were either congenital or the result of inflammation, such as growth of the nucous membrane, suggesting adenoma-like formation with numerous branched spaces or adhesions of the nucous membrane.

The material for this study consisted of thirteen tubes removed at operation, twelve of which were the site of a pregnancy. The other was an apparently normal tube removed along with the ovary. This was the first specimen in which diverticula were seen and hence it is included in this report. It was intended to make reconstructions from complete serial sections of all the specimens, but this was found to be impossible in some. It was possible to do this in four cases, three pregnant and one nonpregnant. All but two of the remaining were sectioned serially so the diverticula when present could be traced and described, but on account of the sections lost between blocks, could

not be accurately reconstructed. Of the two not sectioned serially, one had marked convolutions and one was too large to make this method of study practical. In the twelve pregnant tubes, diverticula were demonstrated in ten, or 83.3 per cent. In all, of course, the pregnancy had been disturbed so that the actual implantation could not be shown. In two cases, however, the demonstration of the only signs of pregnancy, i.e., blood and villi in the blind end of a diverticulum (Cases 5223, Fig. 8, and 4854, Fig. 23) seems to prove that this was the cause of the arrest of the ovum. In another (Case 5638, Fig. 13) the site of the pregnancy was distal to two septa, almost occluding the lumen. It is reasonable to assume that this malformation may have been the cause of the arrest of the ovum. We must be content in the other nine pregnant tubes with diverticula to show them as cases of tubal pregnancy associated with diverticula, without being able



Fig. 1.—Lab. No. 4118. Diagram (drawn to scale from serial sections) showing arrangement of the diverticula in a nonpregnant tube. Section through 13 is shown in Fig. 2.

to prove actually the arrest of the ovum in a blind pocket. No diverticula or other possible etiologic factor was found in two cases, even though they were completely studied by serial section.

In addition to the congenital diverticula there were, in four cases, gland-like inclusions in the tube wall lined with columnar or cuboidal epithelium, the so-called adenomyosis or salpingitis isthmica nodosa.

As far as inflammation in our eases is concerned, we were unable to prove its previous existence except in one case, where definite pelvic adhesions were found at operation, showing the existence of a previous peritonitis. Microscopic study showed, of course, the cellular infiltration always found in association with a pregnancy which has been disturbed, whether uterine or tubal, and which it is impossible to distinguish from true inflammation. In no case could we demonstrate blind pockets in the mucosa alone. The detailed description of the eleven cases with diverticula, ten pregnant and one nonpregnant, follows:

Lab. No. 4118.—This apparently normal, nonpregnant tube was removed with the ovary containing an endometrial cyst. In the routine study a block was taken from the ampulla; it showed three distinct lumina. Unfortunately, by the time the sections were studied this block had been lost, but the remainder of the tube was sectioned serially and the complicated diverticula shown in the diagram (Fig. 1) were

found. This diagram is drawn to scale and is accurate except that because the original block was lost we were unable to determine the origin or the termination of the three lumina, which are shown in Fig. 2.

Lab. No. 4540.—Distal half of tube enlarged to 1.5 cm, in diameter, dark blue in color, with superficial veins markedly injected. Fimbriated end entirely normal, with



Fig. 2.—Lab. No. 4118. Section 13, shows three widely separated lumina. These could not be traced, as explained in the text.

no evidence of bleeding. Tube sectioned in its entirety. The enlargement and color of the tube are seen to be due to a hematoma 0.5x1 cm., in the wall of the tube, Careful search of many sections failed to show any villi in this clot. We were able to trace two true diverticula, as is shown in the diagram, Fig. 3, which is a reconstruction from serial sections. The areas from which the photomicrographs were taken are numbered. The lumen distal to the origin of one diverticulum (Fig. 4)

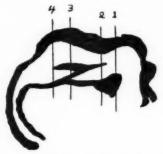


Fig. 3.—Lab. No. 4540. Diagram (drawn to scale from serial sections) showing diverticula in a pregnant tube. Sections indicated by lines shown in Figs. 4, 5, 6, and 7,

was filled with a blood clot in which there were a few villi. These were the only ones found and hence it was impossible to demonstrate the site of implantation.

Lab. No. 5223.—The tube is 5.5 cm. long and 1.5 cm. in diameter at the ampulla. The fimbriated end is free and the tube was split for 3.5 cm. from the fimbriated end, so that now in the fixed condition the cut edges have retracted, exposing a pro-



Fig. 5.

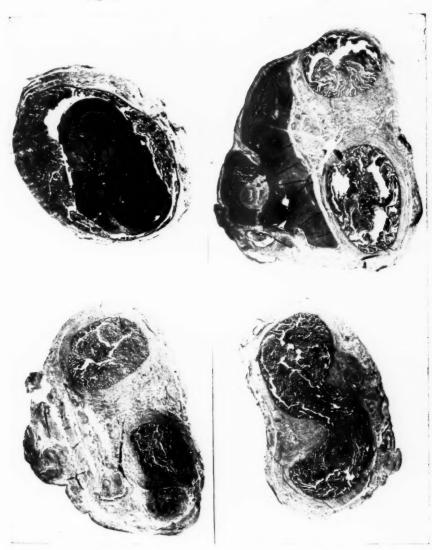


Fig. 6.

d

Fig. 7.

Fig. 4,—Lab, No. 4540. Section 1, shows lumen distal to the diverticula filled with blood clot containing villi.

Fig. 5.—Lab, No. 4540. Section 2, shows the diverticulum at the bottom and the main lumen at the top. The hematoma in the wall contained no villi.

Fig. 6.—Lab. No. 4540. Section 3, shows the other diverticulum.

Fig. 7.—Lab. No. 4540. Section 4, shows the convergence of the diverticulum and main lumen.

truding blood clot 3.5 cm, long and 1.5 cm, in diameter attached to the tube over a very small area. An attempt has been made to show these relations and also the diverticula in the diagram which is shown to scale from serial sections. (Fig. 8.) From the fimbriated end to Section 2, there is a single large lumen illustrated in Fig. 9, the blood clot containing villi being seemingly on the outside, due to the fact that it was opened while fresh and retracted during fixation. Fig. 10 shows the beginning of the septum (marked by arrow) separating the lumen from the diverticula. Fig. 11 shows the main lumen continuing with the blood clot in the diverticula, and Fig. 12 is taken at just about the blind ending of the diverticula. This case shows without question that the site of the pregnancy was in the diverticulum.

Lab. No. 5638.—Tubal rupture at isthmus. The tube is 5 cm, long and the middle 4 cm, is enlarged to 1.5x2 cm., with an opening 0.5 cm, in diameter, 1.5 cm, from uterine end. No adhesions. On section the enlarged portion of the tube is filled with what appears to be placental tissue and blood clot. The tube, with the exception of the fimbriated end and 0.5 cm, of the uterine end, was cut into five blocks and sectioned serially, and a diagrammatic reconstruction made as shown in Fig. 13. The ovum was, of course, disturbed and its original site of implantation could not be shown, but the evidences of pregnancy, i. e., villi and blood clot, were all found in a diverticulum lined with tubal mucosa, and which has a very small connection with the main lumen. Other diverticula and septa are best explained by the diagram and sections.

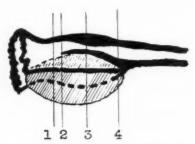


Fig. 8.—Lab. No. 5223. Diagram (drawn to scale from serial sections), showing blood clot with villi caught in blind end of diverticulum, which had been split open in the fresh state, allowing the clot to protrude.

Lab. No. 4391.—Only about the distal half of the tube was available for study. This, with the adherent blood clot and tissue resembling placenta measures 8x3.5x2.75 cm. The blood clot is densely adherent about the fimbriated end which is distended by placental tissue. Sections through the fimbriated end showed numerous chorionic villi in the lumen and buried in the tube wall. As the uterine end was approached the villi disappeared, but the lumen was well filled with blood and there appeared an accessory lumen which later joined the main lumen. Owing to the fact that serial sections were not done when this specimen was first received we were unable to determine the origin of this diverticulum and cannot prove that it had any connection with the pregnancy, so must be content to show this case as one of a tubal pregnancy associated with diverticula, without proving any relation between the two. The photomicrograph shows the one lumen filled with blood and the other flattened out and near the periphery.

Lab. No. 4644.—What is apparently a complete ovisac, measuring 2x2x1 cm., was found in blood clot outside the tube. Only the distal portion of the tube was removed. It measured 4 cm. long by 3x2 cm., and was surrounded by blood clot which occluded the fimbriated end. This was cut into two blocks and sectioned almost

Fig. 12.

Fig. 9.—Lab. No. 5223. Section 1, taken distal to the diverticulum, showing clot in the main lumen, the walls having retracted since it was opened before fixing. Fig. 10.—Lab. No. 5223. Section 2, taken just at origin of diverticulum. Arrow points to the septum.

Fig. 11.—Lab. No. 5223. Section 3, shows the clot in the diverticulum with its walls retracted and the separate main lumen.

Fig. 12.—Lab. No. 5223. Section 4, taken at the blind end of the diverticulum. Several sections further on it has completely disappeared and the main lumen above continues.

serially. We were unable to prove the original site of implantation, villi being found in the lumen and tube wall in many sections, but think it probable that it occurred near the fimbriated end.

The most interesting feature of the specimen is the accessory lumina or true diverticula which we have been able to trace. Starting near the fimbriated end there is a single very large, irregular lumen with villi implanted in the wall, which divides into two, one with the appearance of a normal lumen and the other very irregular with the walls in apposition (Fig. 21). The latter divides into two parts, the smaller of which again divides. These three diverticula, each surrounded by muscle, can be followed to their blind termination, leaving only the main lumen. In none of these could the site of implantation be found. All the blocks could not be studied satisfactorily on account of the destruction of the ovum, etc., so there might have been other diverticula which could not be demonstrated. Besides these large diverticula there are many microscopic gland-like structures in the wall (adenomyoma). On the surface of the tube are many structures which we take to be epithelial implantations as described by Sampson. There are also in the tube wall many lumina lined by multiple layers of round or polygonal cells probably representing remains of Gaertner's duct.

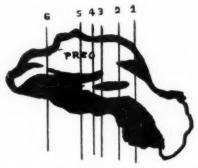


Fig. 13.—Lab. No. 5638. Diagram (drawn to scale from serial sections), showing complicated diverticula and the very small opening (at section 6) proximal to the pregnancy.

Lab No. 4780.—Accurate gross and microscopic study of the specimen was impossible because it had been opened longitudinally along the distal half while in the fresh state and a clot 2x1 cm, had been removed. As received in the laboratory in the fixed state it was distorted, which made it impossible to secure sections sufficiently close to serial to reconstruct the entire tube. It was practically normal in size, with the incision exposing the lumen to which the clot adhered. No fetal or chorionic tissue was recognized in the gross. Entire tube was cut into blocks. About the middle there was a blood clot in the wall. The diagnosis of pregnancy was made certain by the finding of villi in the clot removed from the lumen, and also in the lumen of the tube. The blood in the wall described in the gross was borne out on microscopic section, but no villi or embryo were found in it. Throughout almost the entire tube wall are scattered inclusions of acini lined with columnar epithelium (adenomyoma). In addition we have been able to trace two true diverticula. The opening of one into the lumen was not demonstrated because sections at this point could not be obtained, but from the sections available it seems justifiable to conclude that such an opening was present. The other one could be demonstrated entirely. Both ended blindly in the wall toward the proximal end of the tube. The site of implantation of the ovum could not be identified. The illustration (Fig. 22)



Fig. 14.—Lab. No. 5638. Section 1, taken through the septum between the site of pregnancy at this point, marked by arrow, and the main lumen below.

Fig. 15.—Lab. No. 5638. Section 2, taken just at tip of septum shown in Fig. 14, and showing a second septum which has appeared below, marked by arrow.

Fig. 16.—Lab. No. 5638. Section 3, shows a third septum (left arrow) and the second septum as in Fig. 15 (right arrow).



Fig. 17.—Lab. No. 5638. Section 4, taken just beyond the tip of the second septum (right arrow), the third septum being marked by right arrow,
Fig. 18.—Lab. No. 5638. Section 5, taken through the tip of a very small septum dividing this diverticulum in two just before it ends blindly. To left is the large lumen containing the blood and villi.

Fig. 19.—Lab. No. 5638. Section 6, taken just at the tip of a small septum (indicated by arrow) which with a similar one just opposite almost occludes the lumen, the pregnancy being distal to this point.

shows the opened lumen and also another, deep in the tube wall. Small gland-like structures can also be made out.

Lab. No. 4854.—Specimen consists of both tubes and ovisae with the fetus, which is a male, measuring 9.5 cm. in length. The pregnant tube measures 8 cm. long and 3.5 cm. in diameter at its largest portion, the ampulla. The fimbriated end is dilated and there is a rent extending from the fimbriated end inward for 3 cm. The ovisae, open and collapsed, now measures 6 cm. in diameter and the placenta is attached to the inner surface of the tube through this rent. On section of the tube there is seen in the ampulla, at the place where the placenta has been described as being attached to the inside of the tube, another lumen masuring 7x4 mm. Entire tube was cut in blocks for serial study. The extra lumen described in the gross is also shown microscopically, as is another smaller one—these in addition to the large space occupied by the ovisae. The placenta is torn away but many villi still remain, and that this was a lumen is easily told by the intact tubal epithelium which still remains. Following these two smaller ones through serial sections it is seen that the smaller

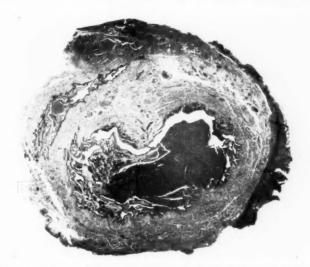


Fig. 20.—Lab. No. 4391. Shows one lumen filled with blood and another flattened out close to periphery on right.

one gradually increases in size and finally joins the larger one, continuing as one for a short distance, when they again separate; one gradually decreasing in size to end blindly. Through many sections there is just the one lumen and then again another one appears and continues separately but later joins the first. Throughout all these sections the large ruptured lumen continues. It had evidently been torn throughout its entire length, so that in the sections it disappears along the outside of the tube where there was old adherent blood clot. Serial sections continued proximal to the gestation sae show also accessory lumina. A second one appears and finally fuses with the first and at the most proximal portion apparently enters the uterus as a single opening.

This case is interesting because we have at the site of pregnancy three distinct lumina, one of which, very large and ruptured, is the site of implantation. This one is entirely separate from the others and in the study of serial sections definitely does not continue throughout the tube but is lost and disappears apparently along the outside of the tube. This is doubtless a case where the ovum was arrested in a blind end of an accessory lumen. The photomicrographs show two lumina in addition to

the site of the ovisac. The other tube shows an adenomyoma of the interstitial portion.

Lab. No. 5002.—The tube measured 6 cm. in length and 2x2.5 cm. in diameter for 5 cm. of its length. Fimbriae were normal. No adhesions and no blood externally, Tube cut into six blocks. About the middle the lumen was dilated to 4.25 cm. with blood clot. Distal to this the increased size of the tube was due to thickening of the

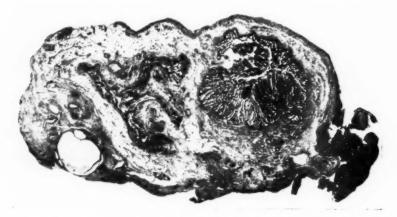


Fig. 21.—Lab. No. 4644. To the right is seen the main lumen; to the left the diverticulum.



Fig. 22.—Lab. No. 4789. The open lumen is shown to the right and a diverticulum is seen almost in the center, deep in the tube wall.

wall. Distal to the blood clot no abnormalities are seen. Unfortunately, sufficient sections were lost between two blocks to make the demonstration of the origin of the diverticula possible. A single extra lumen, one-fourth as large as that containing the blood clot with villi, is seen. This divides into two and a third makes its appearance just at the edge of the section, and the three continue through about one hun-

dred sections. Then two unite (Fig. 24) and later this one disappears, the remainder continuing until another diverticulum branches off from the large lumen, and these two unite to form one. Here again sections were lost between blocks so the end of this could not be demonstrated, the remainder of the blocks showing no diverticula. The site of implantation could not be identified because there were only a few villi in the blood clot.

Lab. No. 5225.—Specimen consists of tube with small portion of the cornua of the uterus attached. The isthmus and ampulla are of normal size, but the fimbriated end is lost in a large mass measuring 5.5x4.5x5 cm. When received, this mass had been opened and was filled with old blood clot. No structure recognizable. On cross section the wall varied from 4 mm. to 2 cm. in diameter, the thickest portion containing a lumen 8 mm. in diameter and separate from the larger cavity containing the old clot. Microscopically this large cavity is lined by tubal mucosa and separate



Fig. 23.—Lab. No. 4854. The opened lumen which contained the ovum is seen below, with some blood clot containing villi still adherent. To the right a large lumen and just to the left of this a smaller one.

rated by muscle from the smaller lumen (Fig. 25). One of these is a diverticulum. On account of the size of the specimen serial sections were impractical, so we cannot demonstrate the junction of the diverticula and main lumen. All that can be said is that here is a case of tubal pregnancy associated with a diverticulum. Several other features of the specimen are interesting. First sections through the cornua of the uterus show numerous cavities, some cystic and larger than the lumen, scattered diffusely through the muscle. They are lined with columnar or cuboidal epithelium without surrounding stroma (adenomyoma). There is also a moderate round-cell infiltration. The isthmus shows the cavities to a lesser extent, but some of them are filled with blood. The ampulla proximal to the pregnancy shows marked polynuclear and round-cell infiltration, both in wall and mucosa. At the site of the pregnancy round cells predominate.

Lab. No. 5484.—The tube is free of adhesions, markedly convoluted and measures 6 cm. in length. Fimbriae are free. Two and five-tenths cm. from the uterine end

is an enlargement 1 cm. in diameter. On account of the marked convolutions, serial sections, as far as diverticula are concerned, would be valueless. Only one thin block could be secured without the possibility of cutting the same lumen twice. From

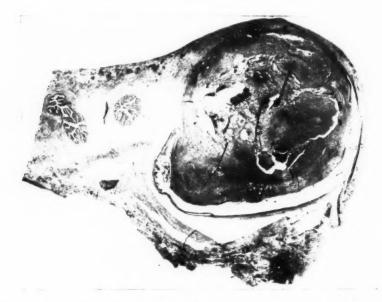


Fig. 24.—Lab. No. 5002. The main lumen filled with blood is seen at the right. To the left three diverticula, two of which are just uniting.

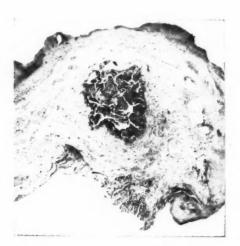


Fig. 25,—Lab. No. 5225. Below is the opened lumen which contained the old clot. Above is another lumen,

this enough sections were obtained to demonstrate a diverticulum and its junction with the main lumen. Both contained blood clot and villi. The illustration shows the two lumina both containing blood and villi.

#### CONCLUSIONS

Of twelve cases of tubal pregnancy, diverticula were demonstrated in ten, or 83.3 per cent.

In three of the ten cases the malformation was directly responsible for the arrest of the ovum, and it probably was in the others.

In view of these findings, even in so small a series, it seems reasonable that diverticula are more common than is usually believed, and that they are an etiologic factor of considerable importance in the production of tubal pregnancy.

Since preparing this paper there has appeared in the Archiv für Gynäkologie, 1926, exxvii, 609, an article by Schoenholz entitled "Untersuchungen über die Ursachen der Eileiterschwangerschaft," in which he reports the examination of thirty-two pregnant tubes. In fifteen there were congenital diverticula; in two there was division of the lumen into separate spaces by mesh formation of the mucosa, a con-



Fig. 26.—Lab. No. 5484. Shows two lumina, both containing blood and villi.

genital defect. In seven cases there were both diverticula and mesh formation. In two cases there were diverticula plus cystogenic tissue. In six cases no cause was found. In none of his cases does he think inflammation played any part in the anomalies. Inflammation can cause adhesions and kinks, however, and in this way may also be the cause for tubal implantation, but it cannot be decided how great a rôle these adhesions play in disturbing the passage of the ovum or what their influence upon its retention in a pocket.

#### REFERENCES

Henrotin and Herzog: Very Early Rupture in Ectopic Pregnancy in a Diverticulum, New York Med. Jour., 1899, lxv, 576.

Hoehne: Die Aetiologie der Gravitas Extrauterina, Archiv f. Gynäk., 1917, evii, 73.
 Landau and Rheinstein: Beiträge zur Pathologischen Anatomie der Tube, Archiv f. Gynäk., 1891, xxxix, 273.

Loeb, Leo and Hunter, J. W.: Experiments Concerning Extrauterine Pregnancy and the Influence of Operation on the Course of Pregnancy, Univ. of Prenn. Med. Bull., December, 1908.

Micholitch: Zur Actiologie der Tubenschwangerschaft, Ztschr. f. Geburts., 1903, xlix, 42.

Ruben: Early Ovum in Fallopian Tube, Proc. New York Path. Soc., 1912, xii, 107.
Schoenholz, L.: Congenital Anomalies of the Tubes, Ztschr. f. Geburts., 1924, lxxxvii, 56.

Williams, C. D.: Etiology of Ectopic Gestation, Surg., Gynec. and Obst., 1908, vii, 519.

Williams, J. W.: Contribution to the Normal and Pathological Histology of the Fallopian Tubes, Am. Jour. of Med. Sc., October, 1891.

#### PREGNANCY IN UTERUS DIDELPHYS®

By Palmer Findley, M.D., F.A.C.S., Omaha, Neb.

THE doubling of the uterus has little clinical significance other than in event of pregnancy. Indeed, it may be said that this malformation is compatible with a normal sexual life save in exceptional instances. From a study of recorded cases one is impressed by the frequency with which the anomaly remains unrecognized even in event of childbearing. Furthermore, it is apparent that radical measures have been employed in not a few instances and sometimes to a degree that cannot be justified in the light of accumulated experience.

In the uterus didelphys the bodies are completely separated and are commonly of unequal size. As a rule they lie in the same transverse plane, though occasionally they are found one in front of the other and particularly so in event of pregnancy, the empty uterus lying behind the pregnant body. The cervices are completely separate or welded together. The vagina is usually divided unequally by a more or less complete septum. The adnexae do not differ from those associated with a normal uterus save in the relative frequency of hematosalpinx when associated with atresia of the cervix and vagina. It is noted that the inner surfaces of the divided bodies are avascular in that the uterine and ovarian blood supply is confined to the outer aspects of either half of the uterus. The two bodies are in part separated by a vesicorectal fold of peritoneum which is said by some authorities to account for the failure of coalescence of the müllerian ducts. In several of the recorded cases there has been a doubling of the vulva, urethra, and bladder and wide separation of the pubic bones. This broadening of the pelvis is thought by some to be an etiologic factor in the development of a double uterus in that the müllerian ducts are widely separated and fail to coalesce. Secondary sex characteristics are noted, such as abundant distribution of hair and small breasts.

<sup>\*</sup>Presented at the Fifty-first Annual Meeting of the American Gynecological Society, Stockbridge, Mass., May 20, 21, and 22, 1926.

Of the lesions associated with the double uterus, hematometra is the most common. Two cases are reported by Gross in which hematometra was bilateral. When unilateral and the other uterus menstruates at intervals, the clinical diagnosis is confounded and in event of torsion of an accompanying hematosalpinx or of an ascending infection arising out of a long-standing hematometra, much confusion may arise both in diagnosis and treatment. It is of interest to observe that in an ascending infection of gonorrheal or puerperal origin the resultant lesions are commonly unilateral and lend themselves to conservative surgery, if such be indicated, in that the unaffected side may be left to carry on its normal functions.

In all cases, before resorting to operative interference, it is well to catheterize the ureters because of the occasional absence of the right kidney and ureter. In no case has the left kidney been found want-



Fig. 1.—Case 1. Uterus didelphys in thirty-sixth week of pregnancy. Pregnancy in right uterus, Left uterus previously pregnant with delivery of dead fetus at seventh month of gestation. Completed operation.

ing. Jaboulay records a case in which a hysterectomy was done for cancer of the cervix and the only existing ureter was severed.

Referring to the frequency of uterus didelphys, Stolper found ten in 7400 married women, while Neugebauer found but three cases in 19,000 examinations. Guerin-Valmale asserts that pregnancy occurs in two-thirds of all cases. The case of Robertson suggests the unusual fertility of some of these cases. In his case there were delivered, one baby in the first pregnancy, two in the second, three in the third, four in the fourth and three in the fifth, making in all a total of thirteen babies in five pregnancies. In the last labor the uterus ruptured. There are numerous instances where from three to nine babies

have been born and not infrequently the malformation was not recognized until after two or more deliveries. Long-standing sterility has been relieved in a few cases by severing the vaginal septum, thereby demonstrating that sterility is not always chargeable to the doubling of the uterus. II. Bernard collected 100 cases of uterus didelphys; in five of this number cohabitation was embarrassed by a septum vaginae; seven were sterile, 26 aborted, and 46 gave birth to viable babies.

It is generally conceded that abortions are more frequent in the didelphic than in the normally developed uterus. Dunning estimates the frequency of abortions at 23 per cent of all cases. Boin finds one interruption of pregnancy to 3.3 per cent of full-term pregnancies.



Fig. 2.—Case 2. Full-term pregnancy in uterus didelphys, Double vagina, double cervix, double corpus, normal tube and ovary attached to either body of uterus. Pregnancy in right uterus fourteen months before. Patient delivered with difficulty through natural passage at seventh month of gestation. Baby died on third day. Delivered five pound perfectly formed baby from left uterus by abdominal cesarean section, March 2, 1922. Mother and baby OK. Picture shows completed operation.

Gouterman records a case in which there were three full-term deliveries and nine abortions. Picot's case had 14 abortions. Wertheim holds that the relative frequency of abortions is accounted for by the poorly developed uterine musculature, which Rokitanski describes as very thin. In this connection we recall the case of Oker-Blom in which there were nine pregnancies—five on the right side and four on the left. The left uterus was the smaller of the two and all four of the pregnancies on that side ended prematurely, while from the fully developed uterus on the right side all five pregnancies went to full term.

The diagnosis of pregnancy in uterus didelphys is presumedly difficult if we are to judge from the many instances in which the condition has failed of recognition. If the case is first seen late in pregnancy there is little likelihood of recognizing the anomaly because the empty body usually lies behind the pregnant uterus and the cervix may be so elevated as to be inaccessible to the examining finger. As evidence of the difficulties in diagnosis, witness the many cases in which there was a preoperative diagnosis made of pregnancy complicated by fibroids, ovarian cyst or ectopic pregnancy. In a few instances the diagnosis was not made until after a uterine sound was passed into either uterus, or the abdomen opened and operative measures well under way, even to the extent of inadvertently opening into the pregnant uterus. It is when the nonpregnant uterus menstruates



Fig. 3.—Case 3. Uterus didelphys with full-term pregnancy in right uterus. Primipara. Baby in situ.

at intervals that confusion in diagnosis is most likely to arise. Bucura, however, doubts the occurrence of menstruation from the empty uterus and opines that the cause of menstruation, whatever it may be, operates on both sides simultaneously.

The duplexity of the uterus presents numerous instances of what may well be assumed to be examples of superfetation. There is an unobstructed passageway through the vagina, cervix, nongravid body and on to the ovary, together with a genetic reaction within the uterus as evidenced by the development of a decidua. Independence in function is evidenced by the recurrence of menstruation in the nongravid uterus throughout part or the whole of the period of gestation in the other body. Some there are who will not accept the theory of superfetation, preferring rather the theory of arrested development.

Dubierre reports a case of twin pregnancy with an interval of fourteen weeks between deliveries. Frepet's case had an interval of two weeks and in the case observed by Williams there was a full-term birth followd by the expulsion of a four months' fetus. Küstner finds a maximum of seventy-four days between deliveries.

It is of interest to note the behavior of the nongravid uterus. It serves as an appendix to the pregnant uterus and as the pregnancy advances it is commonly dragged behind the pregnant uterus where it may and indeed frequently does retard the progress of labor. It may contract during labor and thereby contribute its quota to labor pains. In many instances the cervix is observed to dilate in labor. Commonly by the third, fourth, or fifth day of the puerperium the decidua is cast off from the nongravid uterus, either in its entirety or in fragments. Pery reported a case in which the decidua was expelled prior to labor, and Blaise one in which the decidua was expelled five months after labor. Retained decidua may lead to infection. Axler is of the opinion that puerperal infections more often arise from the nongravid side. Meriel's case developed a pyometra which called for hemihysterectomy. Accompanying the expulsion of decidua, the loss of blood may be very great.

The behavior of the pregnant uterus is of paramount interest in respect to the management of these cases. In the minds of some who have reported cases there seems to have been grave doubts as to the ability of the uterus to perform its function and an unwarranted emphasis has been placed upon the casualties involved in labor; hence, the numerous cases in which Poro operations and cesarean sections with sterilization have been performed. It is true that labor is somewhat prolonged, due to the underdevelopment of the uterine musculature and cervix, to the relative frequency of breech presentations and more than all to the encroaching empty uterus. In this connection we note with interest the case of Leve in which there were eight easy, rapid labors, followed by a ninth pregnancy with the development of a mole. In ten recorded cases labor was obstructed by the presence of a hematocolpos, requiring the emptying of the blood before delivery could be effected. Rupture of the uterus has been reported by Boni, Winter, Donald, Walls, Gossel and Tissier, Rokitanski and Moldenhauer and postpartum hemorrhages are perhaps a little more frequently encountered than in the normally developed uterus, but these casualties are not so frequent as to warrant radical surgical intervention in advance of a test of labor.

It is evident that the management of pregnancy and labor in uterus didelphys should differ not at all from that of pregnancy in the normally constituted uterus. Only in the event of complications should operative interference be invoked. Spontaneous delivery is possible, is frequently accomplished and should, therefore, govern our conduct.

11'-

vo th

2)

11

CI.

T'e

It

01

11.

he

OP.

ve

er

142

01

0-

10

d

IS

0-

11-

d

of

0\_

1-

ď

The double uterus lends itself to conservative management in that it may be possible to sacrifice one uterus and conserve the other. Where, however, the two bodies are welded together, such conservatism is impossible. Döderlein observes that many of these cases are delivered spontaneously; that version and forceps deliveries are relatively frequent; that craniotomy has been performed in exceptional cases and, finally, that cesarean section affords the greatest satisfaction. In a case of Döderlein's the baby's life was lost through prolonged labor. In a subsequent labor he chose cesarean section, saving both mother and baby. On the other hand Jeff Miller cites a case in which a spontaneous delivery was effected two years after a hemihysterectomy.

The percentage of breech presentations is high. Polak estimates the frequency at 40 per cent. Shauta says that operative measures are indicated only in the presence of an obstructing septum vaginae or empty uterus incarcerated behind the pregnant uterus. He would sever the vaginal septum and, failing to dislodge the incarcerated nongravid uterus, he would do a cesarean section. Veit would choose between cesarean section, forceps, and version, having failed to dislodge an impacted nongravid uterus. The delivery of the placenta may be likewise embarrassed by the encroachment of the nongravid uterus. In event of uterine rupture, or the presence of fibroids and ovarian cysts, the management does not differ from that of a normally formed pregnant uterus with like complications.

W. Herwin reported a case in which he divided the vaginal and cervical septa, removed a pus tube, did a salpingostomy on the opposite side, suspended either half of the uterus and subsequently delivered a baby through the natural passage. Barton Hirst writes of a case in which he proposed to perform a plastic operation to correct the deformity, but the woman became pregnant before she could decide to be operated. Derner reports a case where coitus was practiced per urethram. Dilatation of the vagina was soon followed by pregnancy.

I have collected 132 cases from the literature and personal correspondence to which I have added three of my own, making a total of 135 cases. All represent a complete doubling of the uterus, cervix, and vagina, and all have been pregnant. From personal correspondence I am indebted to the following for case reports: Harold Miller, Heaney, Curtis, Campbell, Polak, Norris, Stein, Ehrenfest, DeLee, Farrar, J. T. Baldwin, Lauf, Brooke Bland, Barton Hirst, E. W. Power, DeNormandie, Greenhill, Jeff Miller, E. L. King, Mundell and from the Sloane Hospital for Women the four cases of Williams, W. M. Findley, Levey, and Bunzel. Analysis of these cases discloses the following data:

In the 135 cases there were 217 full-term babies born; 83 spontaneous deliveries, 23 cesarean sections, 1 eraniotomy on a dead fetus, 2 Porro operations, 1 hemihysterectomy, and 1 death from rupture of the uterus.

The indications for cesarean section were: delayed labor due to encroaching empty uterus, 5 cases; puerperal convulsions, 2 cases; atresia of the vagina, 1 case; insufficient pains, 1 case; toxemia, 1 case; simple flat pelvis, 1 case; fear of thin uterine wall, 1 case; breech presentation, 3 cases. In the remaining 8 cases no other explanation was given than the presence of a double uterus, and in one instance a double cesarean section was performed in a twin pregnancy.

Dr. Farrar did a hemihysterectomy on a case in which Dr. Cragin had removed the body of one uterus. In this case there had been three abortions. Heaney delivered by cesarean section at full term and excised the tube on the pregnant side upon observing the extreme thinness of the uterine wall. In a case cited by Polak he performed a cesarean section and four years later a baby was born spontaneously. In two cases there was drainage of an obstructing hematocolpos before delivery could be effected; one was delivered by forceps, the other by version and extraction. There was retention of the placenta in two cases requiring manual removal. In one of these cases the patient died on the operating table. The septum vaginae was divided in three cases to permit of delivery.

The 22 remaining cases were delivered by forceps or version and extraction.

In the 135 cases there were: 216 full-term babies with 6 deaths, 13 twin pregnancies, 15 premature deliveries, 86 abortions, 2 malformations of the baby, and 13 breech presentations.

Following are the three cases which have occurred in my private practice:

Case 1.—Mrs. W., age twenty-three. Para ii. Referred by Dr. F. S. Williams, Villisca, Iowa. Duplexity of uterus, cervix, and vagina discovered by Dr. Williams when he had delivered with great difficulty a dead seven months' fetus about two years before. The placenta adhered. The left uterus was pregnant. The second delivery was estimated at about the thirty-sixth week of gestation. After four hours of hard pains, in the absence of any dilatation of the cervix or engagement of the presenting part, an abdominal cesarean section was done on the right uterus. The right tube was resected. Mother made an uneventful recovery; the baby was living and well-formed. There were no pelvic abnormalities in the mother.

Case 2.—Mrs. S., age twenty-five. Para ii. Double uterus discovered in first pregnancy five years ago when the appendix was removed. This pregnancy went to full term and a dead fetus was removed by cesarean section after four days of labor. An infected wound resulted. Patient lost blood almost continuously throughout the following year. I first saw the patient in the eighth month of her second pregnancy. She was poorly nourished and anemic. The right half of the uterus extended to the costal arch, the left uterus had rotated behind the pregnant uterus and was estimated to be the size of a man's fist. There were two completely sep-

arated cervices and the vagina was equally divided by a thick verticle septum. I performed a second cesarean at the onset of labor in view of the history of having had a previous cesarean and this followed by an infected wound. The baby weighed four pounds and eight ounces, had club feet and gave evidences of prematurity. It died in forty-eight hours. The mother made an uneventful recovery. The tube on the pregnant side was resected in the second cesarean. Both pregnancies or urred on the right side. There were extensive adhesions throughout the pelvis. The previous cesarean scar was firm.

Case 3.—Mrs. S., age twenty-two. Para i. Referred by Dr. A. C. Stokes of Omaha. The patient had a justo minor pelvis, was poorly nourished and extremely neurotic. The pregnancy proceeded to full term with breech presentation. The baby was in the right half. The left uterus was enlarged to the size of a four weeks' pregnancy and lay behind the pregnant uterus. At onset of labor, at request of patient and husband, an abdominal cesarean section was performed. Whether this patient could have delivered spontaneously or with forceps or version 1 do not know but unquestionably the labor would have been difficult and prolonged because of the small pelvis and breech presentation. Mother made an uneventful recovery, baby lived and was well developed.

#### CONCLUSIONS

- 1. The uterus didelphys is compatible with a normal sexual life save in exceptional instances.
  - 2. The anomaly is often unrecognized even in event of childbearing.
- 3. Unusual fertility is demonstrated in many cases. Abortions are relatively common and labor is prolonged as a result of poor muscular development in the uterus, small rigid cervix, and the encroaching nonpregnant uterus.
- 4. Errors in diagnosis have been frequent, due to the difficulty in recognizing the nongravid uterus in advanced pregnancy and the occasional recurrence of menstruation throughout the pregnancy.
- 5. The behavior of the nonpregnant uterus is of interest in that it may contribute to the labor pains by its contractions, the cervix may dilate and very commonly a decidual membrane is expelled on the second or third day of the puerperium. Its greatest interest centers in the fact that it not infrequently retards the progress of labor by becoming incarcerated in the hollow of the sacrum.
- 6. The management of pregnancy and labor in the uterus didelphys should not differ from that of pregnancy in the normal uterus save in the event of complications. Spontaneous delivery is the rule.
- 7. In the event of delayed labor due to an impacted nongravid uterus that cannot be dislodged cesarean section is indicated.

AQUILA COURT.

1-

of

0

5:

h

11

9

n

11

n

0

a

à-

6

a

e

d

e

d

ľ

t

S.

9.

t

1

(For discussion, see page 420.)

## LIPIODOL AS AN ADJUNCT TO TUBAL INFLATION IN THE DIAGNOSIS OF STERILITY $^{*}$

By Lawrence M. Randall, M.D., Rochester, Minn.

(From the Section on Obstetrics, Mayo Clinic)

TRANSUTERINE inflation of the fallopian tube is a valuable aid in determining the cause of sterility. By its use one is able to determine accurately whether the tube is normally patent, stenosed, or entirely occluded. In rare instances, a stenosed or closed tube is perhaps opened by the pressure employed during inflation, but these instances are so infrequent that the therapeutic value of the Rubin test is practically nil in that respect. In two cases severe obstructive dysmenorrhea was relieved for several months by inflating the tubes to 200 mm, of pressure. Both women had nonpatent tubes and the maximal pressure could be used.

Although the method is a great step forward in accuracy of diagnosis, it does not point out the site of stenosis or occlusion. The closure may be a complete obliteration of the entire, lumen or simply obstruction at one point. The situation of the lesion is quite important in considering the prognosis in a given case. It is well known that the fimbriated end is a common situation of adhesions which seal off the tube. Closure at this point occurs in an otherwise normal pelvis and may be amenable to surgical treatment. Closure is also common in the narrowed portion of the lumen, either in the interstitial or isthmic portions of the tube. Obstruction at either of these points is rarely relieved by operation.

It would seem that some method of actually visualizing the site of obstruction would be a valuable adjunct in the diagnosis of the cause of sterility in the female. This idea is neither new nor original, and various substances have been injected into the genital tract for this purpose. Recently a new compound, lipiodol, has appeared which seems well adapted to this use. It is a definite chemical compound in which 40 per cent iodine is firmly bound to poppy-seed oil. It is thoroughly impervious to roentgen rays, noncaustic and nontoxic, because iodine is concealed in the material and cannot be detected by chemical reactions. Out of 5,000 injections made by Sicard and Forestier, there were no accidents except in one case of brain tumor. Injected into the uterus and tubes, lipiodal produces a sharp shadow in the roentgenogram which outlines the cavity of the uterus and the

<sup>\*</sup>Submitted for publication, March 31, 1926.

lumen of the tubes. The technic of injection is simple and painless, and a portable x-ray machine yields excellent pictures.

The indications for the use of lipiodol are the same as those for tubal inflation. The contraindications are also identical with those governing the Rubin test, namely, acute or subacute infection and uterine bleeding. The injection should not be given near menstrual periods; it is best carried out half way between them.

The procedure with a sterile patient begins with a carefully taken history and is followed by a thorough general physical and gynecologic examination. The necessary laboratory tests, including the blood Wassermann, are done as a routine. Possible foci of infection are thoroughly investigated. The husband, if present, is examined for fertility. If the husband is absent, the necessity of this examination of the husband by the home physician is impressed upon the patient. If there are no contraindications, transuterine tubal inflation is carried out by the method of Rubin. Should this show normal patency, the injection of lipiodal is usually unnecessary. If the inflation reveals a high-grade stenosis or actual obstruction, lipiodol is injected twenty-four hours later. This interval allows absorption of the carbon dioxide used in the inflation.

The patient is instructed to take an enema shortly before reporting for injection. She is placed in the lithotomy position, a sterile speculum inserted, the mucus cleared from the cervical canal, and iodine applied to the endocervix. This is wiped out with a dry applicator which is allowed to remain in place until the injection is ready. Ten cubic centimeters or lipiodol are sufficient for the ordinary case, and often from 5 to 7 c.c. is enough. An ordinary record syringe is used, to which is fitted the cannula from the Rubin apparatus. The solution is drawn into the syringe, the cannula attached and the solution forced through until all air is excluded. The applicator is removed from the cervix and the cannula inserted. Pressure on the syringe plunger is made gently and slowly until the patient begins to complain of eramp in the region of the uterus. This cramp is due to the distention of the uterus and the tube with lipiodol. Pressure is relaxed for a moment until the cramp disappears and then reapplied until cramp is again noted. The procedure is repeated once more and then the roentgenogram is taken. This technic has been adopted because in some cases the cramp was first noted before the cavity of the uterus and lumen of the tube were completely filled with lipiodol. The incomplete filling obviously results in inaccurate pictures. In the patients with stenosis of the tube, the escape of lipiodol is without danger, according to Forsdike,1 and in the experience at the clinic no evidence of peritoneal irritation has been noted.

Lipiodol has been used with impunity in the roentgen-ray diagnosis

IE

aid to or is is

i to exiag-

18-

ply orwn eal vis

he al, or

is

is peby nd

111

or. ow he of diseases in many parts of the body, according to Sicard and Forestier,2 and Sicard and LaPlane.3

The roentgenogram is valuable in enabling the physician to discuss the cause of the sterility and the prognosis with the patient. It gives a clear outline of the point of obstruction which is in itself an index to the value of surgical treatment for a given case.

#### ILLUSTRATIVE CASES

Case 1.—A woman, aged twenty and married four years, had had one miscarriage four months after marriage, following an automobile accident. No history of infection could be clicited. Shortly afterwards, laparotomy was performed elsewhere for removal of a small cyst from the right ovary, suspension of the uterus, and appendectomy. Recovery was without incident but the patient has not conceived since that

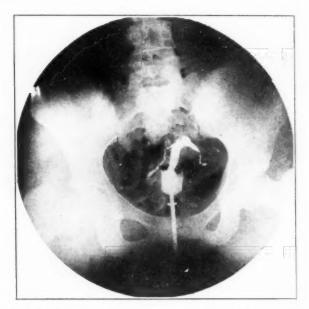


Fig. 1.-Lipiodol in the cavity of the uterus and the lumen of the tubes.

time. Recently, she has complained of pain in the right lower quadrant related to constipation and aggravated by active exercise.

General examination revealed a tonsillar tag in the base of the right fossa, periapical abscess of the upper first molar tooth, and mild cystic mastitis. The urine
contained albumin 2 but no casts. A night specimen, not catheterized, showed only
a trace of albumin, and the albuminuria was finally determined to be orthostatic.
The renal and cardiac findings were negative. Pelvic examination revealed slight
vaginismus, cystic cervicitis, and a little nonpurulent leucorrhea. The uterus was in
second degree retroversion and normally mobile. The tubes and ovaries seemed clear
saye that traction on the right adnexa produced the same kind of pain as exercise.

Tubal inflation showed that the cervical canal was easily patent and did not bleed. The tubes were not patent to 200 mm, of pressure. Lipiodol was injected twenty-

and

uss

ves

t to

age

fee.

benhat

V

ıf.

F

four hours later. The roentgenogram shows that the solution filled the cavity of the uterus and the lumen of the tubes (Fig. 1). It stopped abruptly near the outer end, leaving a club-shaped shadow. No solution was evident in the culdesac.

The patient is extremely anxious for children and elected an exploration with the sole idea of obtaining relief from the obstruction near the fimbriated end of the tube. Operation revealed that both tubes were occluded at the fimbriated extremity by calcerous nodules. That on the left was 8 by 3.5 mm., and that on the right was 5 by 5 mm. in size. These were removed, and about one-third of the right tube reseted. The left tube was kept practically intact. The uterus was suspended by a modified Gilliam operation. There was an adhesion between the right ovary and cecum which probably explained the pain. This was freed,

Comment.—This patient is a favorable type for operation. On the evidence afforded by tubal inflation alone, the operation would have



Fig. 2.—The solution in the uterus and distending the uterine cornua.

been undertaken blindly and perhaps needlessly. With injections of lipiodol, however, the site of occlusion could be predicted and the operation undertaken with some hope of a good functional result. Particularly is lipiodol valuable when, in the presence of nonpatent tubes, bimanual examination and the history do not reveal evidence of pelvic disease.

Case 2.—A woman, aged twenty-seven, married five years, had never been pregnant. She had had rather severe obstructive dysmenorrhea but no pelvic inflammation. The husband had been examined elsewhere several times and pronounced fertile after each examination. Dilatation for dysmenorrhea was done five years before examination, and dilatation and curettage for sterility three years before, elsewhere. The patient had taken ovarian extract for the last two and one-half years and thyroid extract until her heart "began to pound."

General examination was negative. Laboratory examinations, including the blood Wassermann, were also negative. Pelvic examination revealed that the uterus was small with a small firm cervix held well out of the posterior fornix. The uterus was normally mobile. No lesion could be made out in either adnexa.

Tubal inflation showed that the cervical canal was normally patent and clean. The tubes were not patent to 200 mm, of pressure. Lipiodal was injected twenty-four hours later. The solution filled the cavity of the uterus and distended the uterine cornua but did not escape into the tubes (Fig. 2).

Comment.—As no infectious process had been at work in the pelvis, it is possible that the internal genitalia were underdeveloped, even though the uterus was not typically infantile. Tubal inflation is often unsuccessful in such cases, even when antispasmodics are administered. In this case laparotomy seemed contraindicated.

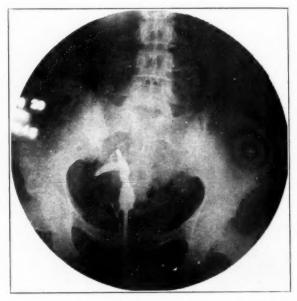


Fig. 3.—The solution filling the body of the uterus and cornua.

Case 3.—A woman, aged twenty-six, married five years, had had considerable obstructive dysmenorrhea. The "pus" appendix and the right ovary had been removed elsewhere three years before examination. A cyst of the thyroglossal duct brought her to the clinic, and this was removed here. The patient had had two miscarriages without incident four years before, and the laparotomy followed in six months. There was no history of pelvic infection other than that which might have resulted from the appendicitis.

The general examination revealed negative findings aside from the cyst of the thyroglossal duct. Laboratory examinations, including the blood Wassermann, were negative. Pelvic examination disclosed that the cervix was clean. The uterus was normal in size and shape but pulled to the right and slightly rotated. The tubes were not palpable. The left ovary was slightly tender and not freely movable,

blood

Was

terus

lean.

ente the

vis.

ven

ten

red.

lile

en

net

is

six

re

he Le as es

Tubal inflation revealed patency of the cervical canal and slight, rather thick aucous discharge. The tubes were not patent to 200 mm, of pressure.

Lipiodol was injected twenty-four hours later. The roentgenogram showed the body of the uterus and cornua filled with the solution but no filling of the tubes (Fig. 3). Occlusion here was at the proximal end of the tube and surgical intervention seemed inadvisable.

#### SUMMARY

The use of lipiodol offers a further means of accurately diagnosing tubal obstruction and stenosis as a cause of sterility in women. After tubal inflation has shown nonpatency or stenosis of the tube, the site of closure or stenosis can be accurately detected by its use in connection with roentgenograms. This information is of value in considering the advisability of surgical treatment in an otherwise normal pelvis. Such tubes are always symptomless and frequently unaccompanied by other pelvic lesions; hence there would be no other indication for operation. As a rule, women who consult physicians primarily because of sterility are otherwise normal, and it certainly is not justifiable to subject them to surgical operation without the benefit of as accurate a diagnosis as possible. Uncomplicated tubal occlusion is a frequent cause of sterility and the question of laparotomy is often brought up by the patient. If the site of closure can be located, one can much better judge the value of operation in a given case. Should the obstruction be in the narrowed portion of the tube the prospect of success from a plastic operation on the tube will not be good. With pathologic change at the fimbriated end, which is relatively common, and the lumen patent to this point, operation may be justifiable. It carries with it a fair chance of success, provided other conditions are normal.

The technic of injecting lipiodol is simple and involves no special apparatus. It is practically painless. The same care is used as in transuterine inflation of the tubes.

#### REFERENCES

Forsdike, Sidney: The Investigation of the Uterus and Fallopian Tubes by Air and Opaque Bodies in Sterility, Jour. Obst. and Gynec., Brit. Emp., 1925, xxxii, 505-511.

Sicard, J. A., and Forestier: Iodized Oil in Diagnosis of Abscess, Bull. et mém.

Soc. méd. d. hôp. de Par., 1925, i, 345-346.

Sicard, J. A., and LaPlane, L.: Diagnostic des tumeurs rachidiennes: forme pseudo-pottique: radio-lipiodol, Presse méd., 1925, xxxiii, 33-37.

## A CASE OF EARLY OVARIAN PREGNANCY ASSOCIATED WITH UTERINE PREGNANCY\*

BY HIRAM N. VINEBERG, M.D., F.A.C.S., NEW YORK, N. Y.

OVARIAN pregnancy is of sufficient rarity to warrant the publication of every genuine case encountered. Its rarity may be conjectured from the fact that in a fairly extensive public and private practice extending over a long period, the case I am about to report was the first I found. It has an additional interest in the circumstance that it was associated with intrauterine pregnancy.

Mrs. C. was referred to me Jan. 31, 1926, by her family physician for the purpose of doing a therapeutic abortion. She was thirty-three years of age, married eight years and had given birth to a child seven years before. In the third month of that pregnancy she had a fairly severe attack of pyelitis, with two to three recurrences during the remainder of the gestation. The labor came on at full time, was normal and so was the pregnancy, but she was very slow in recovering, felt weak and tired easily.

About two years before she consulted her doctor as to the risk of bearing another child. He found a fair amount of pus in the urine and an x-ray examination revealed a shadow the size of a ten-cent piece in the cortex of the right kidney. She was referred to a prominent urologist who made a very thorough examination and came to the conclusion that the shadow indicated a renal calculus. Owing to its position, he advised nephrotomy for its removal. The operation was performed in January, 1925. On exposing the kidney no calculus was found, but the organ was fibrous and shrunken to half the normal size and it was, therefore, deemed advisable to remove it. Recovery was uneventful, but since then there has always been a trace of albumin in the urine and an occasional east.

Her menses set in in her seventeenth year, were of the 4 weekly type, of 4 to 5 days' duration, and rather scanty. Her last menses were on Dec. 2, 1925, and were due again Dec. 30. She was therefore nine days overdue. The uterus was slightly enlarged and in retroversion of the second degree. The cervix showed some appreciable discoloration.

I suggested waiting for another week to make certain of the diagnosis but the patient felt confident she was pregnant, judging from past experiences and from the fact that she never went overtime.

In view of her history and the condition of the remaining kidney, the indication for interrupting the pregnancy admitted of no doubt.

On the following morning, Jan. 9, I performed a curettage at Mount Sinai Hospital. The curette brought away a considerable amount of tissue, which seemed to me the unmistakable products of early uterine conception. There was the usual amount of bloody discharge for the next four or five days; the pulse and temperature remained normal and the patient felt so well that she insisted upon going home on the seventh day.

On Jan. 17, the morning after she left the hospital, she had a slight attack of pain in the left lower quadrant of the abdomen. She stated it was not of a colicky

<sup>\*</sup>Read at a meeting of the New York Obstetrical Society, May 11, 1926,

nature, but rather like a continuous ache. I saw her at 2 p.m., when there was a recurrence of the attack. I found slight distention of the lower part of the abdomen and on bimanual examination, the uterus was markedly tender. The left fornix was also tender on pressure, but no mass was to be felt. The os was slightly open and there was a scanty pinkish discharge.

I learned now she had had a slight attack of a similar nature on Jan. 13, three days before she left the hospital, but, as it was relieved at once by an enema, it was ascribed to flatulence and no further attention was given to it. The pulse and temperature were normal. My impression was that there might still be some residue in the uterus or retention of the discharge owing to the malposition, but the character of the pain did not tally with that supposition nor did it conform to that of cetopic

ea-

onate ort

uried ath rene,

reshe nd its in as ole

5 re ly

10

1



Fig. 1.—Low power magnification of section through entire corpus luteum and site of implantation of pregnancy. Defect in this area is site of rupture.

pregnancy, the other condition I had in mind. I gave expression to these two thoughts to the attending physician and to the members of the family.

On the following morning, Jan. 18, there was another attack of pain and again at 6 P.M. 1 saw her at 7 P.M. The lower abdomen was now more distended, the tenderness of the left fornix was more marked and there was a sense of fullness in the posterior culdesac.

I had no hesitation now in making a definite diagnosis of ruptured ectopic pregnancy. The patient was readmitted to Mt. Sinai Hospital at 10 p.m., and an hour later I opened the abdomen in the median line. There was a fair amount of free blood in the lower abdomen in the pelvis. The left tube looked perfectly normal and

so did the right tube, but there was a small raw area on the surface of the left ovary, which, on closer inspection, proved to be a ruptured corpus luteum. I was inclined to look upon the condition simply as hemorrhage from a graafian follicle or corpus luteum, but the extirpated ovary was subjected to microscopic examination.

The right tube was ligated and cut, the proximal stump being peritonealized. The uterus was ventrofixated and the abdominal wound closed in the usual manner. The patient bore the operation very well and made an uneventful recovery.

Pathologic Report.—Grossly the specimen consisted of fallopian tube, ovary and some blood clots. The tube was tortuous and patent and showed no gross abnormal-



Fig. 2.—Medium power magnification of section showing syncytial and trophoblastic cells.

ity. Directly under the abdominal ostium of the tube and attached to the surface of the ovary is a tiny clot which covers a small defect, measuring about 4 mm. in diameter. This hemorrhagic area apparently is the site of recent hemorrhage. On section of the ovary the blood clot and hemorrhagic defect can be seen resting upon a yellow corpus luteum.

Histologie examination of the corpus luteum and defect shows a well advanced, normal corpus luteum without hemorrhage. The theca luteum cells are well developed. Situated on one point on its outer surface is an area, the base of which shows the remains of granulosa luteum cells infiltrated with blood and surrounded by numerous thin walled capillaries. Invading the wall of this depressed hemorrhagic area are numerous syncytial masses and clumps of trophoblastic cells. There seems

to be the normal marked tendency for invasion of the vascular channels; some of which are markedly dilated, thin-walled sinuses.

Sections through several areas of the fallopian tube showed no abnormality.

eft

vas ele

na-

The

he

nd

al-

tic

ace

in

On

noc

ed.

vel

ows

by

gie ems There is great discrepancy as to the incidences of ovarian pregnancy as expressed by different writers. This arises from the circumstance, that even up to the present time, there is no consensus of opinion as to the conditions necessary to establish its presence.

We all know the conditions laid down by Spiegelberg as far back as 1878. They were: (1) the tube on the affected side must be intact; (2) the fetal sac must occupy the position of the ovary; (3) it must be connected with the uterus by the uteroovarian ligament; (4) definite ovarian tissue should be found in the sac wall. To these Williams had added another important condition: ovarian tissue must be present in several portions of the sac wall, at some distance from one another. Morris emphasizes that the adjacent tube should not only be intact, but microscopically free from any of the processes of gestation.

Meyer and Wynne refer to the oft-quoted opinion of Tait, that ovarian pregnancy was rare as a blue lion or a swan with two necks, and also to the opinion of Bland-Sutton, that ovarian pregnancy, not only has no existence, but that it is impossible. This was true in 1899. Bland-Sutton changed his opinion five years later on studying a case reported by Clarence Webster.

Only after 1900 did German writers begin to report cases of ovarian pregnancy with some frequency. Lockyer in 1917 accepted as authentic only 22 of the 58 reported between 1910 and 1917.

Meyer and Wynne maintain, that in the light of our present knowledge, some cases were rejected for insufficient reasons. They hold that not even the entire absence of remnants of the conceptus can positively exclude a case from the category of true ovarian pregnancy. They agree with Scott on a priori grounds alone, that the conceptus may be completely resorbed. This assumption receives support from the case they report and from several cases found in the literature. They make the further assertion that many of the cases of profuse intraperitoneal hemorrhage reported in the literature as being due to rupture of a graafian follicle or corpus luteum, were probably cases of genuine ovarian pregnancy. They maintain that idiopathic hemorrhage from a graafian follicle or corpus luteum is exceedingly rare. In fact, if we were to accept their attitude as to the criteria of ovarian pregnancy, we would never exclude this condition in any case of hemorrhage from the graafian follicle.

This assumption receives some support from the case reported. In most instances it would have been assigned, without further investigation, to the group of follicular or luteal hemorrhage. It might have been done in this instance were it not that I had a very alert assistant.

The discrepancies in the incidence of ovarian pregnancy are well illustrated by the following. Lockyer accepted as authentic only 22 cases of 42 reported between 1910 and 1917. In practically the same period Meyer and Wynne, from 1908 to 1917, collected 58 cases, only 4 of which they deemed doubtful.

Schumann in his monograph on Extrauterine Pregnancy, in 1921, quotes Norris' collection of 19 positive cases from the literature up to 1909. He adds the 22 cases accepted by Lockyer from that date to 1917 and the case reported by Meyer and Wynne in 1919, a total of 42 cases. A review of the literature from that date up to the present, shows 17 cases reported. All but three fulfilled the criteria of authentic cases of ovarian pregnancy, thus making a total of 14 cases for the period of 1921 to 1926.

• My case falls into the group of early cases. The case reported by Dr. J. I. Hunter is probably the earliest on record. The operation was performed 24 days after the last menstruation. The removed ovary showed the presence of a growing blastocyst, which was apparently less than three weeks of age. This indicated that fertilization must have taken place after the last menstrual period prior to the operation.

#### REFERENCES

Barna, A.: Eine Junge Eierstock Schwangerschaft, Zentralbl. f. Gynäk., 1925, xlix, 718.

Brooks, O., and Charpier, L. L.: Jour. Am. Med. Assn., 1923, lxxxi, 110.

Brouha: Un Cas de Grossesse Ovarienne Jeune, Gynec. et Obst., 1923, viii, 335. Chalfont, S. A.: Ovarian Pregnancy with Report of a Case, Penn. Med. Jour., 1920-1921, xxiv, 548.

Fallon, Michael F.: A Case of Ovarian Pregnancy, Boston Med. and Surg. Jour., 1921, elxxiv, 144.

Frank, L. W.: Ectopic Gestation, Probably Ovarian, Kentucky Med. Jour., 1921, xix, 821.

Fuchs, H.: Eierstock Schwangerschaft, Monatschr. f. Geburtsh. u. Gynäk., 1923. lxii, 61.

Good, F. L., and Richards, T. K.: Ovarian Pregnancy, Surg., Gynec. and Obst., 1923, xxxvi, 239.

Hunter, J. I.: A Case of Early Human Ovarian Pregnancy, Jour. Anat., London, 1921-1922, lvi, 57.

Jacobs, J.: Ein Fall einer Ausgetragenen Ovarial Schwangerschaft, Zentralbl. f. Gynäk., 1923, xlviii, 193.
Krause, H.: Eine Junge Eierstock Schwangerschaft, Ztschr. f. Geburtsh. u. Gynäk.

1924, lxxxviii, 390.

Martin, J. H., and McIntyre, D.: A Case of Ovarian Pregnancy, Jour. of Obst. and

Gynec. of British Empire, 1923, xxx, 647, two plates.

Moulorguet, Doldris: Contribution á l'étude de la Grossesse Ovarienne, Gynec., 1924,

xxxiii, 257. Renwetts, R.: Zwei Fälle von Ovarial Schwangerschaft, Zentralbl. f. Gynäk., 1924, xlviii, 670.

Robinson, A. Leyland: A Case of Ovarian Pregnancy, Jour. Obst. and Gynec. of British Empire, 1924, xxxi, 410.

Suvansa, S.: A Case of Intraperitoneal Ovarian Pregnancy with Full-Term Child, Lancet, March 29, 1924, p. 648.

(For discussion, see page 422.)

#### THE PRESIDENTIAL ADDRESS\*

#### THE AMERICAN GYNECOLOGICAL SOCIETY

By Franklin S. Newell, M.D., Boston, Mass.

0

of

11

ed

p-

m

1e

ix,

20

1r.,

21,

23,

st...

on,

f.

äk.,

and

24,

924,

of.

ild,

.)

THE presidential addresses at the annual meetings of this Society combined with the scientific papers form an almost complete record of the development of modern gynecology and obstetrics. The mistakes are recorded equally with the successes and the fact that many procedures now obsolete have been ardently advocated at our meetings does not detract in any way from the value of this record, since we learn more from our failures than from our successes. The completed whole is a worthy monument to the founders of this Society, whose vision has made it what it is.

This meeting marks the completion of fifty years of active work in the life of the Society, and would seem to be an appropriate occasion to recapitulate the constructive work accomplished by our members past and present, but the presidential address of five years ago so completely covered the subject as to leave no opportunity for such a memorial.

When this Society was founded, gynecology was an undeveloped specialty, and obstetrics as practiced today was not even dreamed of. The years which have passed have seen a steady development in gynecology up to its present point of relative perfection. It is hardly possible that a similar development can take place in the next fifty years. The founders of this Society were the pioneers in the specialty and it is to their inspiration that we owe in large part the great advances which have been made. It is interesting to note that in the earlier transactions many procedures now commonplace were once subjects of bitter controversy, while others which were generally accepted have become obsolete. Our predecessors were developing a new field of surgery at a time when asepsis was either unknown or in its infancy, and each step forward was fraught with hypothetical or actual danger. Operations which are now definitely standardized were once considered the height of rashness, while each advance was violently opposed by the conservatives of the time, only becoming accepted after absolute proof of its safety and of its benefits to the patient was demonstrated.

Gynecology has been so developed that we can expect comparatively little advance in its main principles, except in the treatment of malig-

<sup>\*</sup>Presented at the Fifty-first Annual Meeting, Stockbridge, Mass., May 20, 21, and 22, 1926.

nant disease, and possibly in the application of the advances which may be made from time to time in our knowledge of the endocrines. Our work as operating and investigating gynecologists must be largely limited to the refinement of diagnosis and to the improvement of operative technic where that is possible. The dangers which beset the paths of our forbears have been largely eliminated.

Equally striking, though less conclusive, developments have taken place in obstetrics, since our whole conception of the subject has been radically altered, but there remain many unsettled problems in this field which require investigation. The literature of the last fifty years shows that not only has the treatment of practically every obstetric complication been radically altered and the possibility of the prevention of many of them become recognized, but obstetrics has been developed into a surgical specialty. The recognition of cesarean section as a legitimate procedure in appropriate cases has made it necessary for the obstetric specialist to be a trained surgeon. As time goes on it may be that the low cervical operation will entirely supplant the classical operation, but outside of this possible development there seems to be no great change which can be made in operative obstetrics except a closer limitation of operations to qualified operators for definite indications.

The application of surgical technic to obstetrics has greatly lessened the frequency of septic infection. In the practice of a well-trained obstetrician of today the development of a case of septic infection of a serious nature is rare, except under conditions which develop when an epidemic, such as influenza, is rampant in the community,—so rare indeed that our interns receive little training in the treatment of this condition. Nevertheless, septic infection is still so common among patients under the care of men not surgically trained that the statement is often made that the conditions have improved little in general practice.

The treatment of septic infection is still unsatisfactory, however. We have learned not to kill our patients by indiscriminate curettage, but we have not yet learned how to control virulent infections except by raising the patients' resistance and thus aiding nature. Prevention rather than cure is our sheet anchor in this important complication. Future progress must place the care of the obstetric patient in the hands of the surgically trained man if septic infection is to be abolished either in hospital or in private practice, and an increasing number of semiprivate obstetric beds must be provided in our hospitals to provide for the safety of those who cannot afford the fee of the specialist and yet do not belong in a charitable institution, this being the class in the community for which little provision is made at the present time.

Our knowledge in regard to the toxemias of pregnancy and eclamp-

f

n

n

18

rs

le

n-

1.

as

nr

it

1e

re

es

f-

ed

ed

of

en

re

iis

ng

te-

ral

er.

ge,

ept

en-

ea-

121

be

ng

05-

of

his

at

np-

sia has been increased to some extent. We have not yet learned what toxemia is, but we have perhaps a greater understanding of what it is not. The advances have been such that we have reason to feel that the development of eclampsia in any patient is a reproach to the attendant and argues either a lack of intelligent prenatal care or an inability to appreciate the warnings of danger. We cannot prevent the development of the milder forms of toxemia in the present state of our knowledge, since we do not know the actual cause. We can recognize the danger signals, however, and either minimize the dangers by prompt treatment or cut short the pregnancy if treatment fails, and thus practically render eclampsia an obsolete condition. The laboratory diagnosis of toxemia by blood chemistry and allied methods is still of little practical value, but an intelligent interpretation of the blood pressure changes combined with accurate clinical judgment will save many lives.

This advance and many other improvements in the care of our patients have been due to the recognition of the importance of careful prenatal study, which is perhaps the greatest advance in obstetries in the last fifty years. The prevention of complications, or at least their early recognition at a time when they can be adequately treated, is one of the great advances in preventive medicine.

The importance of a careful study of the pelvis has been recognized in this country during the last twenty-five years. Every student in a well organized medical school of today is instructed in the taking and interpretation of the pelvic measurements and in the comparison of the size of the baby with the pelvic canal. In the practice of a well-trained obstetrician no patient is allowed to go into labor today without the possibilities of dystocia having been thoroughly canvassed, and in doubtful cases an appropriate course of action is decided upon in advance for each individual patient, and the patient is given the advantages of modern progress in accordance with her needs.

In general practice, however, little more attention is paid to the pelvis apparently than twenty-five years ago. The attitude of the general practitioner is still one of hope that no untoward conditions are present and that no obstruction to labor exists, rather than one of foresight. It must be remembered, however, that the majority of general practitioners of today, particularly in the smaller communities, were not trained under modern conditions and have had little or no opportunity to improve their early training. A distinct improvement should occur when the men who have been trained in the last ten years come into their own.

Great as the advances in obstetries have been in the last fifty years it is only a beginning. We know little about the toxemias. We know the end-results in neglected cases. We do not know, however, the etiology or the nature of the poison, and the scientific treatment of the

toxemias must remain in abeyance until the etiology has been def. initely settled.

The possibility of the regulation of the size of the fetus is another problem that has not been adequately studied. We do not know how far it may be possible to control the size of the child in a given case without reducing the mother's vitality by starvation to a point which is unsafe. This offers a very attractive field for study.

We are still in doubt as to the best method of induction of labor in eases in which premature termination of pregnancy is necessary. Presumably no single method is applicable to all eases. My own experience leads me to believe that we are using the best of several more or less unsatisfactory methods, rather than that we have discovered an ideal method, and I find that I can never get the results reported by my friends who strongly favor some particular method. These are only a few of the many obstetric problems open to investigation and it is probable that in obstetrics the next fifty years will show even greater advances than the last fifty.

With the development of the obstetric specialist many fads have entered into practice. The delivery of all patients by a certain method undoubtedly renders the individual obstetrician very proficient in that particular operation and thus leads to improvement in the technic of the operation. In his hands the results become exceedingly good, but when less proficient individuals try to follow his example, disaster is sure to follow. The routine induction of labor at a given date, when no indication is present except the saving of time for the patient and attendant, has resulted disastrously for the mother and child in many cases. The operative craze which has led to the performance of cesarean section for no good and sufficient reason has led to the loss of many lives. Obstetrics must be reduced to a sane basis with only one object in view, an increase in safety for mother and child rather than the popularization of any particular procedure before the results can be called satisfactory.

The obstetrician must be trained as carefully as is the surgeon for his life's work. With the increase in the number of well-trained men the results of the future should be much improved. The better education of the men who are to practice and teach obstetrics will result in a better training for the members of the medical profession as a whole and in a steady improvement in obstetric standards. The interest in the study of obstetrics seems to be definitely on the increase among medical students. For the first time they realize that modern obstetrics is more than expectant midwifery, which argues well for continued progress.

This progress in obstetrics and gynecology is part of a general advance which involves the whole of medicine and which has had a great influence on medical teaching. New specialties have been devel-

oped and have found a place in the medical curriculum. The laboratory branches have assumed an increasingly prominent place in medical education and have to a very unfortunate extent encroached upon the time formerly devoted to clinical teaching, and medical education, the final aim of which is the training of doctors, has gradually passed more and more under the domination of the laboratory group, which is composed of men who have never taken care of patients and who have little conception of the training necessary for a practicing physieian. We are most of us teachers as well as clinical practitioners, and it is our duty to so train students that they shall be fitted to minister to the needs of patients, unless we are ready to admit that the work of the great clinicians of the past is of no value to the community as compared to laboratory research. A sound scientific training is important, but it behooves us to see to it that the present tendency to overemphasize the importance of the so-called fundamental medical sciences in our medical schools is reduced to a sane basis. The great majority of medical students expect to practice medicine, but they are often unfitted for this end by their very training, owing to the undue emphasis laid on laboratory diagnosis and treatment, and the much reduced attention given to the training of their powers of observation and to the study of the patient. Conditions must be changed, since, unless the student is fortunate enough to supplement his medical school training by an internship under a good elinician instead of, as often happens, under a full time appointee who has never had any clinical experience outside of a hospital ward, he is obliged to enter practice, if in fact he dares to do so, with little practical training in the care of the patient and none in the humanities of medicine.

The medical course has been gradually lengthened in the last fifty years, first to three and then to four years, while in some institutions a fifth or hospital year is either required or is under consideration. In spite of this lengthening of the medical course the amount of time devoted to clinical subjects has been relatively curtailed, until an entirely disproportionate amount of time is devoted to the laboratory sciences, in the attempt to make them not an adjunct to the proper training of physicians but the predominating force in medical education.

The raising of medical standards should result in attracting a higher grade of men to the profession than formerly, as well as in turning out better equipped physicians, but in my judgment the student body of today is not of as high a grade as it was ten to fifteen years ago. Apparently the present system is dwarfing instead of developing the average student, the curtailment of the time allowed to the clinical courses resulting in the teaching of too much predigested material instead of aiding him to develop by the study of patients under intelligent guidance.

lefher

OW

ase ich in re-

erie or
an
by
are

ven

ave
hod
chat
e of
but
er is

hen

and

any esas of one han can

for men eduesult as a nter-

ease

dern

for

adad a

Many of the ablest men in medicine today would find it impossible to enter a Class A medical school without returning to college to take a special course to meet the entrance requirements, and yet they are among the leaders of the profession. The required premedical course is of such a nature that unless a student decides relatively early in his college career to study medicine he cannot complete the required work without devoting at least an extra year to it, a sacrifice of time and money which many men cannot afford to make. Theoretically the premedical course should raise the standard in the medical school by eliminating the relatively unfit and the poorly educated. It does this to some extent, but it also eliminates many men who after careful and mature consideration arrive at the decision toward the end of their college course that they wish to study medicine. Many who are relatively unfit for the practice of medicine decide early that they wish to enter the medical profession and take the necessary courses which enable them to do so, while a considerable number of men who are in every way unusually well fitted for the profession are barred from it. unless they are able to devote one or two extra years to preparation. and these men have been in the past among the ablest students even without the preliminary course at present required and are today at the top of the profession. In addition the marks obtained in college are often the principal basis on which fitness to study medicine is judged, and thus the man of many interests during his college course who is distinctly a well-rounded man is often refused a chance to study for a profession for which he is superlatively well fitted, while a second-rate man who has devoted himself to obtaining high marks in his college courses is accepted. My own impression of the average medical class in our own school, which is supposedly handpicked from a large number of applicants, is that while there are few very poor men in the class, the number of men of outstanding ability is so small that the average is certainly no higher than it used to be and the general impression is one of distinct mediocrity.

My own experience, gained from teaching fourth year students and from dealing with house officers who come to us from various hospitals and medical schools, has convinced me that the students of today are not as well fitted to enter the practice of medicine as those of fifteen years ago. They have perhaps been taught more but have learned less. Their knowledge of the laboratory side of medicine is greater, but when it becomes a question of making a patient comfortable and of meeting the human problems that arise, they are singularly helpless and have little self-reliance.

I feel strongly that, in spite of the great increase in the cost of a medical education necessitated by the research and teaching laboratories, the results are meager. I do not wish to infer by this statement that I do not favor the maintenance of research laboratories in con-

nection with a medical school for the purpose of advancing medical progress in every way, or in any way grudge the expense involved, since I believe that future progress depends on a judicious cooperation between the clinical and research branches, but I do believe that the education of competent physicians to care for the needs of the community suffers when laboratory teaching dominates our medical schools at the expense of clinical training as at present. Less than 5 per cent of a class, according to recent figures, enter the research branches of medicine and yet the whole class must take an exhaustive training in laboratory work which so crowds out clinical training as to work a serious injustice to the 95 per cent or more who wish to practice medicine. Furthermore, a considerable number of men who might be useful and able physicians are dropped from the medical schools each year because they fail to reach the standard of laboratory excellence required, their fitness to continue their studies being judged by men who have never practiced medicine, and yet they are college trained men selected from a large number of candidates.

Before a proper balance can be restored and the study of medicine placed on a sane basis, the present undue importance given to the so-called fundamental sciences must be materially reduced, by which I mean that they must be so taught as to be an aid to the clinical training which is to follow, and not as if the end-result aimed at was to make every student a laboratory investigator. In other words, medical education should primarily serve the 95 per cent who hope to practice medicine instead of the 5 per cent who hope not to. Under modern conditions the great majority of medical students must depend on their postgraduate hospital training for much that should be taught in the medical schools in order that the 5 per cent may need less postgraduate training. The conditions should be reversed.

The great function of the medical schools used to be to train doctors to care for the sick and suffering in the community. The outstanding teachers were men of wide clinical experience who inspired the students by their teaching and example. Such of the medical sciences as were taught were included because they aided in the development of better doctors. With the development of new specialties it was realized that the student must be given some instruction in them, although the only adequate training was to be obtained by postgraduate study. The time to be devoted to the teaching of these specialties was obtained by lengthening the medical course from three to four years, but the four cardinal medical subjects, surgery, medicine, obstetrics, and pediatrics, were still taught by men of broad clinical experience and occupied the major portion of the course, supplemented by practical work in the out-patient departments and by a hospital internship later. With the increase in the laboratory branches of medicine more time had to be provided if the student was to receive

ble ake are are his

ork and the by this

neir elarish nich e in n it,

ion, ven at ege e is urse

to hile arks age

oor nall the

and hoss of nose ave

of a ora-

eon-

ort-

an up-to-date medical education. Since this could only be done by decreasing the time devoted to clinical instruction, it has been so arranged, and the community which pays the bills is the sufferer.

The great clinical teacher has either disappeared or his opportunities for teaching have been so curtailed that his efforts are largely in vain. The control of medical education has been taken over by the laboratory group who are always able to devote an indefinite amount of time to meetings and organization, and the influence of the clinical group in our medical schools is small. As a natural result the medical student of today receives an intensive training in the fundamental sciences, a fairly comprehensive course in laboratory medicine and research, a very minor training in the study of a patient as an individual and not as a test tube, and practically no instruction in the relief of suffering and in the humanities of medicine. This would be a good enough preparation if the primary object of medical training were to fit a man to do research or to practice entirely within a hospital, but it is a very poor training for a man who wishes to enter practice. It is a fortunate thing for the community that the students themselves realize that the training afforded by the medical schools has little practical bearing on the practice of medicine and that a prolonged training as intern and resident in properly equipped hospitals is absolutely necessary.

The increasing interest in research medicine has led to the establishment of full time teaching positions in various hospitals which are affiliated with medical schools. Theoretically a full time appointment should be ideal from the standpoint of research, the teaching of students, and the care of the patient. Practically, the patient suffers in most cases, because if a young man takes such a position, it means that he is interested primarily in research, and perhaps somewhat in teaching, but that he has had little or no experience in the care of the sick. He may be able to stimulate interest in the study of various medical problems and thus as an investigator add to the prestige of his hospital, but the patients under his charge and the students for whom he is responsible are less efficiently served than they would be by a less scientific man of greater clinical experience.

The ideal full time teacher is the man of wide interests and clinical experience outside the hospital, who elects a full time teaching position as offering the widest opportunity for good in the community as a fitting close to an active career, and not the untried man who is selected because of his interest in laboratory problems, and who is sufficiently mediocre to be satisfied with the salary of a second-rate man, provided he can be in a position sheltered from competition.

In many cases the full time teaching position is a menace instead of a benefit since it carries with it a prestige which is not warranted by the facts. Laboratory research is stimulated and therefore some inerease in the sum of human knowledge probably occurs, but the man who wishes to enter the practice of medicine should not have to depend for his training on teachers who have never had to face the problems which are met in private practice and who are not interested in them.

The curricula of our medical schools should be revised. The control of medical education should be not in the laboratories but in the fundamental clinical departments, surgery, medicine, obstetrics, and pediatrics. Such of the laboratory branches as are of direct aid to the study of medicine from a practical standpoint should be taught, and what should be taught in these sciences should be determined by the clinical group. If a man wishes a further education in physiológy or biochemistry, he should take that as a postgraduate course, just as a man who wishes to take up clinical medicine takes an internship, and the amount of laboratory teaching should be cut down and placed on a practical basis. A considerable experience with students from our own and also from other schools leads me to believe that in physiology the attempt is made to train all students to become physiologists and not to instruct them in the application of physiology to practical medicine, and that a similar condition exists in other scientific branches. The time to be devoted to the cardinal clinical medical sciences should be increased to the limit and such time devoted to the teaching of specialties as is possible, with the understanding that no man can be educated as a specialist in the medical school. The clinical teacher should be a man of clinical experience and not a laboratory trained man who has never practiced, as is often the case. The scientific and clinical men should work side by side, and the student should be given a greatly increased training in the use of his powers of observation under the supervision of men who have been properly trained in clinical medicine, the laboratory methods of diagnosis only being employed after exhaustive study of the patient.

Most of us are teachers. Many of us realize the unsatisfactory state of medical education today. I believe that we, in conjunction with the other clinical societies, can accomplish most for the good of the community by a concerted effort to restore the teaching of clinical medicine and the fitting of men to enter practice to their proper position in medical education. The modern graduate may have been taught more but he has learned less than his predecessors. He is a poorer doctor and often hesitates to enter practice except under the ægis of a hospital, because he has had very little training in practical therapeutics and none at all in the humanities of medicine. As has been well said by one of the greatest exponents of modern medicine, it is more important to know what kind of a patient is suffering from a disease than what kind of a disease a patient is suffering from, a fact which has been entirely lost sight of in our medical schools.

osias is is

by

1 80

rtu-

gely

the

unt

ical

ical

ntal

and

ndi-

the

l be

hos-

iter

ents ools

t a

hos-

tab-

are

ent

stu-

s in

hat

ich-

ick.

ical

108-

he

less

ical

l of by

in-

<sup>443</sup> BEACON STREET.

# PLASMA PROTEIN FRACTIONS IN NORMAL PREGNANCY, LABOR, AND PUERPERIUM

By E. D. Plass, M.D., and C. W. Matthew, Detroit, Mich.

(From the Obstetrical Department of the Henry Ford Hospital)

N a previous communication from this laboratory, we reported the total plasma protein variations recognized during the results of the state of the s the total plasma protein variations occurring during normal pregnancy, labor, and puerperium, and constructed a curve showing the average protein content of the plasma at the various periods. This work showed that, "during normal pregnancy the plasma proteins begin to fall in the third lunar month, or occasionally even before that period. and decrease gradually to a minimum at the sixth month, after which there is a slow rise during the latter months of pregnancy with the values at the tenth month still somewhat below normal. A further sharp rise occurs at the time of labor and is continued into the first day postpartum, but in the next twenty-four hours the protein suffers an abrupt decrease, which is maintained for three or four days, and is followed by a rapid rise to normal at the end of the first week." Changes in the plasma volume percentage, as shown by hematocrit readings, were directly opposite to those of the plasma proteins, although of similar magnitude, and it was argued that, in all probability, the curve produced indicated "\* \* roughly the relative changes of plasma and blood volume occurring normally \* \* \* among pregnant women \* \* \*."

This determined reduction of the total plasma proteins during pregnancy confirmed the earlier observations of Zangemeister, <sup>2</sup>, <sup>3</sup> Zangemeister and Meissl, <sup>4</sup> Eckelt, <sup>5</sup> Landsberg, <sup>6</sup> Dienst, <sup>7</sup> Rusznyák, Barát, and Kürthy, <sup>8</sup> Bergmann, <sup>9</sup> and Coetzee, <sup>10</sup> but disagreed with Fähraeus, <sup>11</sup> who found the plasma proteins practically the same in five pregnant women (month of pregnancy not given) as in six normal men, and with Hafner, <sup>12</sup> who recently reported the total proteins definitely increased during gestation. This latter observer used a refractometric method of analysis and compared his results with what is apparently an arbitrary normal value, since he gives no figures for nonpregnant individuals. There is no reason to prefer this work to that done by chemical procedures, as Howell seemingly has done, and, since this author stands quite alone in his position, it is fair to assume that his conclusions are incorrect, and that a reduced concentration of plasma proteins is quite characterisite of pregnancy. Lewinsky's <sup>14</sup> finding of a higher plasma protein in four pregnant women than in one nonpregnant individual needs hardly be considered because of the paucity of the observations.

The various protein fractions have been less studied during pregnancy and upon such small numbers of cases that conclusions cannot safely be drawn. Dienst, Ruszynák, Barát, and Kürthy, and Coetzee have found the albumin somewhat reduced, although Lewinsky reported a slight increase. Hafner made no com-

parisons with nonpregnant women, but found the albumin slightly lower after delivery than before parturition.

Dienst,<sup>7</sup> Fähraeus,<sup>11</sup> and Coetzee<sup>10</sup> found the globulin decreased during gestation, while Lewinsky<sup>14</sup> and Rusznyák, Barát, and Kürthy<sup>8</sup> have reported an increase, and Hafner<sup>12</sup> found a relative increase during pregnancy with a rapid drop in the post-partum period.

CY.

rted

reg-

the

1 to

iod.

tich

the

her

first

suf-

ays,

first

by

sma

, in

the

ally

con-

elt,3

but

e in

ring

com-

rives

k to

this

are

nant

the

apon

nst.7

what

eom-

More uniformity of opinion exists concerning the fibrin (fibrinogen), which is said to be increased during gestation. Dienst,<sup>7</sup> Foster,<sup>15</sup> Gram,<sup>16</sup> Lewinsky,<sup>14</sup> Krösing,<sup>17</sup> Landsberg,<sup>6</sup> Rusznyák, Barát, and Kürthy,<sup>8</sup> Nasse,<sup>18</sup> de Wesselow,<sup>19</sup> and Coetzeel<sup>10</sup> agree that in pregnancy the plasma fibrin is augmented. The majority of these authors found a gradual increase during pregnancy with the highest values at the time of labor, although Gram<sup>16</sup> reported his highest average at the eighth lunar month. Krösing 's<sup>17</sup> figures would indicate a rather rapid fall during the early postpartum period.

Great variations are noted in the reported values for total proteins and for the different protein fractions in normal individuals, and it is quite evident that the results depend largely upon the method of analysis employed. Howe, 13 in a recent review, remarks: "The evalution and correlation of the various observations to show absolute differences in the distribution of the plasma proteins is difficult because of the variety of procedures which have been used in their estimation with the accompanying variations in results." And later: "To single out definite values as representative of particular states, and especially the normal composition of the blood plasma, is exceedingly uncertain." It may be said, however, that normal total protein is usually reported to be between 7.0 and 8.0 gm. per 100 c.c., the albumin between 4.0 and 5.0 gm. per 100 c.c., and the globulin between 2.0 and 3.0 gm. per 100 c.c., with the latter representing 35 to 45 per cent of the total proteins. It would seem that only results obtained by the same analytical procedure should be compared strictly.

In the case of fibrin, more uniform results have been obtained and a figure of about 0.30 gm. per 100 e.c. may be looked upon as normal, although here again different methods give values which can best be compared among themselves.

#### EXPERIMENTAL

We have analyzed 314 plasmas of nonpregnant, pregnant, parturient, and puerperal women, as shown in Tables I, II, III, and IV. An attempt was made to have each group large enough so that individual variations might be compensated, but in the charts which follow (Charts I, II, III, and IV) such variations have been plotted in order that they may not be submerged beneath the average figures. The method of Wu<sup>20</sup> was followed throughout without change and every effort was made to keep conditions identical during the months necessary to complete the task. Occasionally, for no obvious reason, a series of analyses on a particular day, or during a longer period, gave results which disagreed considerably with those immediately preceding and following; such data were discarded. We were frequently unable to determine the reason for such disturbances, but believe that it would be unfair to include the results. A minimum of stasis was employed during the collection of the samples, since it has been

shown by Rowe<sup>21</sup> that obstruction to the venous return very quickly increases the proteins in the plasma.

For convenience, the total proteins, albumin, globulin, and fibrin are considered separately.

#### TOTAL PROTEINS

Table I and Chart 1 give the variations in the total plasma proteins in the various periods, and in the latter each individual determination is represented by a separate dot. In each group some of the specimens were outside of what we consider the limits of normal, but the general trend is well represented by the average (solid line).

TABLE I

TOTAL PLASMA PROTEIN VARIATIONS DURING NORMAL PREGNANCY
(PROTEINS IN GRAMS PER 100 C.C.)

				NO. OF	PLASMA	PROTEIN	PERCENTAGE:
DIAGNOSIS			CASES	EXTRE	MES	AVERAGE	
NORMAL N	ONPREGN	ANT YOUNG	WOMEN	15	6.96 -	7.78	7.42
Normal, p	regnant.	4 to 8 w	eeks	18	6.32 -	8.27	7.22
66	66	9 to 12 w	eeks	17	6.19 -	8.55	7.32
* *	6.6	13 to 16 w	eeks	15	6.79 -	7.82	7.31
		17 to 20 w	eeks	17	6.23 -	7.75	7.11
* *	* 4	21 to 24 w	reeks	15	6.32 -	7.74	7.00
	6.6	25 to 28 w	reeks	17	6.20 -	7.68	7.06
	6.6	29 to 32 w	reeks	15	6.29 -	7.71	7.01
6.6	4.4	33 to 36 w	reeks	15	6.41 -	7.62	6.73
4.6	4.6	37 to 40 w	reeks	15	6.06 -	7.40	7.03
NORMAL, I	PARTURIE	NT, AT END	OF LABOR	15	6.45 -	7.98	7.18
Normal, I	uerperal	, 1st day	p.p.	15	6.37 -	7.64	6.98
4.6	6.6	2nd day	p.p.	15	5.98 -	7.51	6.84
6.6	6.6	3rd day	p.p.	17	6.56 -	7.68	7.25
	6.6	4th day	p.p.	15	6.23 -	7.48	7.00
6.6	4.6	5th day	p.p.	15	6.24 -	7.72	7.21
6.6	6.6	6th day	p.p.	15	5.68 -	7.92	7.23
4.4	6.6	7th day	p.p.	15	6,65 -	7.97	7.30
2.4	4.6	2nd week	p.p.	18	6.09 -	8.06	7.21
66	4.6	3rd week		15	6.81 -		7.37

This curve follows the same general course as that shown in our previous communication. There is a gradual drop during pregnancy and the minimum is reached at the ninth lunar month (rather than at the sixth). The subsequent rise in the tenth month and again during labor parallels the earlier graph. The postpartum lowering is broken by a rise on the third day, which is apparently due entirely to an increase of globulin (see Chart III), and normal values are reached again during the third week after delivery. The lowest point in the entire curve, at the ninth month, represents a decrease of 9.3 per cent from the nonpregnant average, as compared with an approximate 10 per cent reduction previously noted.

The total plasma protein values are slightly higher by the Wu method than by the Kjeldahl procedure previously employed, the difference, according to our parallel determinations, being on the

Total Plasma Proteins During Pregnancy.

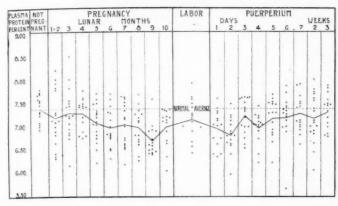


Chart I.

average 0.30 to 0.50 gm. per cent. Using the Wu method, Coetzee<sup>10</sup> reports an average for normal nonpregnant women of 8.05 per cent and Wu<sup>20</sup> gives a comparable figure for his normals. Our own aver-

Plasma Albumin During Pregnancy.

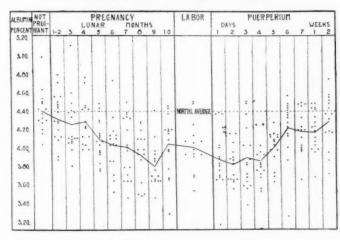


Chart II.

age of 7.42 per cent corresponds more closely to previously reported results obtained by the Kjeldahl method (Landsberg<sup>6</sup>—7.01 per cent; Dienst<sup>7</sup>—7.17 per cent; and Plass and Bogert<sup>1</sup>—7.04 per cent), and we, therefore, conclude that they are the more accurate. The only

explanation we can offer is that perhaps Coetzee and Wu neglected to draw the blood without any considerable venous stasis and so obtained values higher than they should. Some work now in progress shows that stasis very materially increases the concentration of all the protein elements, a fact which is not yet sufficiently appreciated.

#### SERUM ALBUMIN

Table II and Chart II give the determined values for serum albumin in the different periods. As in the total proteins, a considerable individual variation exists.

TABLE II

SERUM ALBUMIN VARIATIONS DURING NORMAL PREGNANCY
(ALBUMIN IN GRAMS PER 100 C.C.)

	-		NO. OF	SERUM ALBUMIN	PERCENTAGES	
DIAGNOSIS			CASES	EXTREMES	AVERAGE	
NORMAL	NONPREGN	ANT YOUNG WOMEN	15	4.06 - 5.02	4.42	
Normal.	pregnant,	4 to 8 weeks	18	3.90 - 4.74	4.34	
6.6	4.6	9 to 12 weeks	17	3.83 - 5.14	4.28	
6 6	6.6	13 to 16 weeks	15	4.01 - 4.80	4.31	
6.6	6.6	17 to 20 weeks	17	3.78 - 4.52	4.13	
66	6.6	21 to 24 weeks	15	3.55 - 4.76	4.06	
6.6	6.6	25 to 28 weeks	17	3,49 - 4,53	4.04	
4.4	4.6	29 to 32 weeks	15	3.51 - 4.31	3.95	
6.6	6 6	33 to 36 weeks	15	3.49 - 4.44	3.83	
6.6	4.6	37 to 40 weeks	15	3,33 - 4.49	4.07	
NORMAL, PARTURIENT, AT END OF LABOR			15	3.56 - 4.53	4.04	
Normal, puerperal, 1st day p.p.			15	3.20 - 4.42	3.91	
6.6	6.6	2nd day p.p.	15	3.58 - 4.18	3.85	
6.6	6.6	3rd day p.p.	17	3.41 - 4.54	3.94	
6.6	4.6	4th day p.p.	15	3,56 - 4.28	3.88	
6 6	6.6	5th day p.p.	15	3.67 - 4.31	4.04	
6 6	6 6	6th day p.p.	15	3.28 - 4.60	4.25	
6.6	6.6	7th day p.p.	15	3.68 - 4.53	4.22	
4.4	6.6	2nd week p.p.	18	3.73 - 4.53	4.21	
66	66	3rd week p.p.	15	3.75 - 4.78	4.33	

Chart II is drawn to a somewhat larger vertical scale than is Chart I so that the variations appear more marked. As a matter of fact, the percentage changes are slightly greater than in the case of the total proteins, the lowest point (3.83 gm. per 100 c.c.) at the ninth month being 13.5 per cent lower than the normal nonpregnant average.

These results in general confirm the work of previous investigators that the serum albumin is lowered during pregnancy, and substantiate Hafner's<sup>12</sup> findings that the albumin is lower postpartum than immediately antepartum. In the 15 nonpregnant women, the albumin represents 59.6 per cent of the total proteins, whereas, at its lowest point in the ninth lunar month, it accounts for 56.9 per cent of the protein,—a change of only 2.7 per cent.

#### SERUM GLOBULIN

ed so

SS

dl

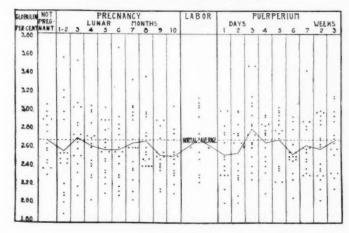
ule Our serum globulin findings are reported in Table III and are graphically recorded in Chart III, drawn to the same scale as Chart II.

TABLE III
SERUM GLOBULIN VARIATIONS DURING NORMAL PREGNANCY
(GLOBULIN IN GRAMS PER 100 C.C.)

		NO. OF CASES	SERUM GLOBULIN PERCENT		
DIAGNOSIS			EXTREMES	AVERAGE 2.69	
NORMAL NONPREGNANT YOUNG WOMEN			2.32 - 3.07		
		t, 4 to 8 weeks	18	1.89 - 3.58	2.57
. 66	6.6	9 to 12 weeks	17	2.09 - 3.55	2.71
6.6	6.6	13 to 16 weeks	15	2.04 - 3.07	2.63
6.6	6 6	17 to 20 weeks	17	2.12 - 3.05	2.59
4.6	6.0	21 to 24 weeks	15	2.09 - 3.70	2.59
6.6	6.6	25 to 28 weeks	17	2.04 - 3.35	2.66
4.6	6.6	29 to 32 weeks	15	2.42 - 3.38	2.68
0.6	6.4	33 to 36 weeks	15	2.14 - 2.92	2.53
6.6	6.6	37 to 40 weeks	15	2.12 - 3.07	2.52
NORMAL,	PARTURI	ENT, AT END OF LABOR	15	2.24 - 3.15	2.71
Normal,	puerpera	al, 1st day p.p.	15	2.01 - 3.02	2.53
6.6	6.6	2nd day p.p.	15	2.02 - 3.02	2.55
6.6	6.6	3rd day p.p.	17	2.27 - 3.50	2.82
	6.6	4th day p.p.	15	2.12 - 2.97	2.67
6 6	6.6	5th day p.p.	15	2.24 - 3.05	2.70
6.6	6.6	6th day p.p.	15	2.07 - 2.95	2.54
6.6	6.6	7th day p.p.	15	2.32 - 3.45	2.64
6.4	6.6	2nd week p.p.	18	2.04 - 3.02	2.60
6.6	6.6	3rd week p.p.	15	2.17 - 3.17	2.68

The curve of average serum-globulin content of the plasma (Chart III) shows no really significant variations from normal. Its lowest point (2.52 gm. per 100 e.c.) at the tenth month is 6.3 per cent below

Plasma Globulin During Pregnancy.



the average normal, while the highest point (2.82 gm. per 100 c.e.) on the third day after delivery is 4.8 per cent higher. As plotted, the separate determinations have a great tendency to scatter, representing a great individual variation in the globulin fraction. Our findings fail to confirm those of previous investigators in that they show no definite change in the serum globulin due to pregnancy. At the eighth month, the globulin represents 37.6 per cent of the total protein, whereas in nonpregnant women it represents 36.2 per cent, an increase during pregnancy of only 1.4 per cent.

Table IV and Chart IV present the changes in the plasma fibrin at the corresponding periods of the reproductive cycle.

TABLE IV

PLASMA FIBRIN VARIATIONS DURING NORMAL PREGNANCY
(FIBRIN IN GRAMS PER 100 C.C.)

DIAGNOSIS		NO. 0F	PLASMA FIBRIN PERCENTAGES		
DIAGAUSIS			CASES	EXTREMES	AVERAGE
NORMAL	NONPREGN	ANT YOUNG WOMEN	15	0.23 - 0.40	0.31
Normal,	pregnant,	4 to 8 weeks	18	0.26 - 0.37	0.31
66	6.6	9 to 12 weeks	17	$0.27 \cdot 0.41$	0.33
4.6	× 6.	13 to 16 weeks	15	0.28 - 0.46	0.37
	6.6	17 to 20 weeks	17	0.29 - 0.52	0.39
	4.6	21 to 24 weeks	15	$0.28 \cdot 0.46$	0.37
		25 to 28 weeks	17	0.28 - 0.50	0.37
		29 to 32 weeks	15	0.27 - 0.50	0.37
4.6	4.6	33 to 36 weeks	15	0.28 - 0.46	0.37
		37 to 40 weeks	15	0.37 - 0.52	0.44
NORMAL, PARTURIENT, AT END OF LABOR			15	0.32 - 0.64	0.44
Normal, puerperal, 1st day p.p.			15	0.35 0.65	0.46
4 6	6.6	2nd day p.p.	15	0.29 - 0.60	0.44
4.4	4.6	3rd day p.p.	17	0.30 - 0.62	0.49
* *	6.6	4th day p.p.	15	0.35 - 0.62	0.45
4.4	4.6	5th day p.p.	15	0.32 - 0.62	0.47
4.4	6.6	6th day p.p.	15	0.31 - 0.56	0.44
6.6		7th day p.p.	15	0.30 - 0.59	0.44
6.6		2nd week p.p.	18	0.30 - 0.59	0.40
		3rd week p.p.	15	0.27 - 0.60	0.36

The plasma fibrin curve in Chart IV confirms in general the reports by previous authors of a fibrin increase during pregnancy, but differs somewhat from their results. During the third and fourth months the fibrin rises to a level of 0.37 gm. per 100 e.c., where it remains quite constant until the tenth month when another increase begins and persists until the third day postpartum, after which the curve slowly falls toward normal.

Calculations of the average whole-blood fibrin, as recommended by Foster and Whipple,<sup>22</sup> from the plasma fibrin values and the plasma volume per cent (hematocrit readings), are found in Table V.

The plasma volume percentage tends to increase in the course of

gestation, as does the plasma fibrin, so that the whole-blood fibrin shows a greater proportional variation than does the plasma fibrin.

c.)

ed, re-

ur

ey

At

nt,

at

h

ie ie

d

f

Calculations of the percentages of the total plasma protein represented by the serum albumin, serum globulin, and plasma fibrin are presented in Table VI.

Plasma Fibrin During Pregnancy.

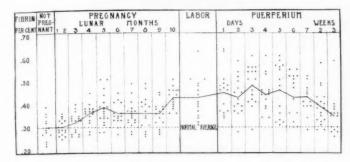


Chart IV.

There is a tendency for the more easily precipitable proteins, the globulin and fibrin, to increase at the expense of the albumin, but at no time during pregnancy is this change very marked, and the uniformity between the protein fractions at the different periods is

TABLE V
WHOLE BLOOD FIBRIN VARIATIONS DURING PREGNANCY
(FIBRIN IN GRAMS PER 100 C.C.)

DIAGNOSIS  NORMAL NONPREGNANT YOUNG WOMEN			NO. OF CASES	PLASMA VOLUME, PER CENT	FIBRIN	
					PLASMA 0.31	0.20
6.6	66	9 to 12 weeks	17	65.7	0.33	0.22
6.6	6.6	13 to 16 weeks	15	67.2	0.37	0.25
4.6	4.4	17 to 20 weeks	17	66.9	0.39	0.26
* *	4.4	21 to 24 weeks	15	69.3	0.37	0.26
4.6	4.4	25 to 28 weeks	17	69.2	0.37	0.26
4.6	**	29 to 32 weeks	15	68.7	0.37	0.25
* *	* *	33 to 36 weeks	15	67.9	0.37	0.25
4.6	66	37 to 40 weeks	15	68.4	0.44	0.30
		NT, AT END OF LABOR	15	66.2	0,44	0.29
Normal,	puerperal	, 1st day p.p.	15	67.4	0.46	0.31
6.6	+ 6	2nd day p.p.	15	70.1	0.44	0.31
* 6	6.6	3rd day p.p.	17	69.9	0.49	0.34
* 4	* *	4th day p.p.	15	66,3	0.45	0.30
* 4		5th day p.p.	15	66.1	0.47	0.31
4.4	4.4	6th day p.p.	15	65.4	0.44	0.29
4.4	4.4	7th day p.p.	15	68.1	0.44	0.30
* *		2nd week p.p.	18	64.8	0.40	0.26
K. K.	4.4	3rd week p.p.	15	66.2	0.36	0.24

perhaps the most noteworthy thing to be gained from Table VI. The fibrin shows the greatest percentage increase, and at its highest point is more than one and one-half times as abundant proportionately as in the nonpregnant woman.

TABLE VI

VARIATIONS IN SERUM ALBUMIN, SERUM GLOBULIN, AND FIBRIN PERCENTAGES OF
TOTAL PLASMA PROTEINS DURING NORMAL PREGNANCY

			NO OF	PERCENTAGE OF TOTAL PROTEIN			
DIAGNOSIS			NO. OF CASES	ALBUMIN PER CENT	GLOBULIN PER CENT	FIBRIN PER CENT	
NORMAL	NONPREGN	ANT YOUNG WOMEN	15	59.6	36.2	4.2	
Normal,	pregnant,	4 to 8 weeks	18	60.1	35.6	4.3	
6.6	6.6	9 to 12 weeks	17	58.5	37.0	4.5	
* 6	6.6	13 to 16 weeks	15	58.9	36.0	5.1	
* *	4.6	17 to 20 weeks	17	58.1	36,4	5.5	
6.6	4.4	21 to 24 weeks	15	57.8	36.4	5.5	
4.4	6.6	25 to 28 weeks	17	57.2	37.6	5.2	
4.4	4.4	29 to 32 weeks	15	56.4	38.3	5.3	
6.6	6.6	33 to 36 weeks	15	56.9	37.6	5.5	
6.6	4.4	37 to 40 weeks	15	57.9	37.7	6.3	
NORMAL, PARTURIENT, AT END OF LABOR			15	56.2	37.7	6.1	
Normal,	puerperal	, 1st day p.p.	15	57.4	36.2	6,6	
6.6	6.6	2nd day p.p.	15	56.3	37.3	6.4	
66	6.6	3rd day p.p.	17	54.3	38.9	6.8	
6.6	6.6	4th day p.p.	15	55.5	38.1	6.4	
	6.6	5th day p.p.	15	56.0	37.5	6.5	
6.6	4.6	6th day p.p.	15	58.8	35.1	6.1	
6.6	6.6	7th day p.p.	15	57.8	36.2	6.0	
6.6	6.6	2nd week p.p.	18	58.4	36.1	5.5	
66	4.6	3rd week p.p.	15	58.8	36,3	4.9	

#### DISCUSSION

The decrease in total plasma proteins during pregnancy was, in our earlier communication, considered as being due to a watery dilution of the blood, and, in view of the evidence supporting that opinion, we are not inclined to change our position. The absolute increase in fibrin and the slight relative increase of globulin agree well with such a dilution hypothesis, since these proteins probably have a greater hydration capacity than the albumin, the fibrin being particularly potent in this direction. Gram<sup>16</sup> believes that the fibrin increase in pregnancy is due to a mild irritation of the liver, but the evidence favoring a disturbance of hepatic function during gestation is so insecure that we prefer not to agree with such an explanation. The whole question of the formation of the plasma proteins is still so unsettled (Howe<sup>13</sup>) that it is quite impossible to make any definite statements.

It is, however, of considerable interest that the fibrin, which is so much concerned in coagulation of blood, shows a marked increase during pregnancy, and especially during the last month, seemingly in preparation for the act of delivery, when a certain blood loss is inevitable, and when prolonged or profuse bleeding might well be fatal. The phenomenon may be regarded as a protective mechanism designed to prevent excessive hemorrhage even though the actual cause of its occurrence may not be known.

The postpartum increase of fibrin is explained by Foster<sup>15</sup> as being due most probably to trauma incident to birth, when the birth canal is inevitably injured to some extent. Foster and Whipple<sup>22</sup> have also shown that hemorrhage leads to a fibrin increase, and the blood loss

Plasma Fibrin and Sedimentation Time.

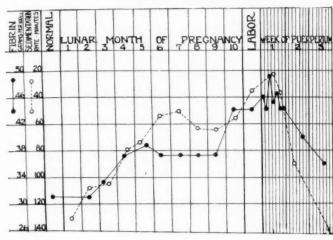


Chart V.

at delivery and during the first few days after delivery may well be factors in the puerperal rise.

Colostrum is particularly rich in globulin, which suggests that the unusually high globulin average on the third day of the puerperal period may perhaps be due to the onset of mammary gland activity, when the secretion of colostrum is especially abundant.

The increased sinking velocity of the red blood cells (Linzenmeier<sup>23</sup>), or the decreased suspension stability of the blood (Fähraeus<sup>11</sup>), during pregnancy has recently received considerable attention. The majority of observers have noted the relation of an increased fibrin content of the plasma to this phenomenon, although some have considered that a rise in the globulin fraction may also be of significance. We have found the globulin to remain practically constant during pregnancy and the postpartum period, whereas the fibrin shows a rise and later fall, which conforms well with the curve

for sedimentation rate that can be constructed from the values given by Linzenmeier.<sup>23</sup> Chart V combines the curves and demonstrates their remarkable similarity.

Undoubtedly, the viscosity and surface tension of the plasma also vary with the quantitative changes in the proteins, but the available data are too few to permit of accurate comparison.

It was thought originally that perhaps changes in the plasma fibrin and globulin, which are supposedly the more hydrophilic blood proteins, might explain the hydroplasmia during pregnancy. The slight relative increase in globulin is probably negligible, but the curves for fibrin and for plasma volume percentage, which is considered an index of plasma dilution, are so generally similar that the idea cannot be entirely abandoned, although it seems that other factors must also be active. In this connection, it is planned to study the acid-base balance in the plasma after the cumulative fashion employed in this and preceding papers. Very slight changes in the hydrogen-ion concentration in the plasma would affect appreciably the hydration capacity of the proteins, and perhaps thus explain the watery dilution of the blood, which is a part of normal pregnancy, and which is even more evident in the toxemias of late pregnancy.

#### SUMMARY

A cumulative study has been made of the various protein fractions in the blood plasma of normal nonpregnant, pregnant, parturient, and puerperal women, using the Wu method of analysis. It was hoped to relate the changes in some one fraction, globulin or fibrin particularly, with the changes in watery dilution of the blood during the reproductive cycle. The curve developed for fibrin corresponds rather closely with that for plasma volume percentage, and it is suggested that perhaps the dilution of the plasma may be directly related to the increase of fibrin, although it is thought that other factors may have a rôle. The cause of the fibrin increase is admitted to be unknown, but not much consideration is given to the idea that it may be the result of a mild gestational injury to the liver. The accurate relationship between the rise in fibrin and the increased sedimentation rate of the blood cells, in the absence of any similar changes in the globulin fraction, leads us to agree with those who believe that the latter is the result of the former, the increased agglutination of the red cells into rouleaux being an intermediate and necessary stage for the increase in sinking velocity. There is a rise of globulin on the third day after delivery which may be directly associated with the onset of milk secretion.

#### CONCLUSIONS

n

a

d

e

n

- 1. The total plasma-proteins tend to be diminished during pregnancy and the early part of the puerperium.
- 2. The serum-albumin is diminished to such an extent that the fall of total proteins can be attributed to the reduction in concentration of this fraction. The relative decrease is slight.
- 3. The serum-globulin undergoes a slight relative increase, although the absolute values remain practically constant.
- 4. The fibrin (fibrinogen) rises during pregnancy to reach a high point shortly after delivery. The relative increase is greater than the absolute change.

### REFERENCES

- Plass, E. D., and Bogert, L. Jean: Plasma Protein Variations in Normal and Toxemic Pregnancies, Bull. Johns Hopkins Hosp., Baltimore, 1924, xxxv, 361-368
- <sup>2</sup>Zangemeister, W.: Die Beschaffenheit des Blutes in Schwangerschaft und der Geburt, Ztschr. f. Geburtsh. u. Gynäk., Stuttg., 1903, xlix, 92-103.
- <sup>3</sup>Zangemeister, W.: Der Hydrops Gravidarum, sein Verlauf und seine Beziehungen zur Nephropathie und Eklampsie, Ztsehr. f. Geburtsh. u. Gynäk., Stuttg., 1919, lxxxi, 491-558.
- <sup>4</sup>Zangemeister, W. and Meissl, T.: Vergleichende Untersuchungen über mütterliches und kindliches Blut und Fruchtwasser nebst Bemerkungen über die fötale Harnsekretion, München. med. Wehnsehr., 1903, 1, 673-678.
- <sup>5</sup>Eckelt, K.: Zur Genese der Symptome der Schwangerschaftsniere, Ztschr. f. Geburtsh. u. Gynäk., Stuttg., 1919, lxxxi, 1-29.
- <sup>6</sup>Landsberg, E.: Untersuchungen über den Gehalt des Blutplasmas an Gesammteiweiss, Fibrinogen und Reststickstoff bei Schwangeren, Arch. f. Gynäk., Berl., 1910, xeii, 693-720.
- Dienst, A.: Die Eiweissstoffe im Blutplasma unter normalen Verhältnissen in der Schwangerschaft und bei der Eklampsie, zugleich ein Beitrag zur Fibrinogenfrage und zur Pathogenese der Eklampsie, Arch. f. Gynäk., Berl., 1918, eix, 669-702.
- sRusznyák, S., Barát, I., and Kürthy, L.: Untersuchungen über die klinische Bedeutung der Eiweissfraktionen des Blutplasmas, Ztschr. f. klin. Med., Berl., 1924, xeviii, 337-346.
- Bergmann, E.: Serumeiweiss- und Erythrocytenbestimmungen an gesunden und hydropischen Schwangeren, Zentralbl. f. Gynäk., Leipz., 1924, xlviii, 1346-1351.
- <sup>10</sup>Coetzee, L. J. (communicated by J. Marrack): The Plasma Proteins in Normal and Abnormal Pregnancy, Proc. Royal Soc. Med., (Sect. Obst. and Gynace.) 1925, xviii, 28-31.
- <sup>11</sup>Fähraeus, R.: The Suspension Stability of the Blood, Acta Med. Scandin., Stock-holm, 1921, lv, 1-228.
- <sup>12</sup>Hafner, E. A.: Ueber den Globulin- und Albuminkoeffizienten des Serums, besonders während der Schwangerschaft, Arch. f. exper. Path. und Pharmakol., Leipz., 1924, ci, 335-364.
- <sup>13</sup>Howe, P. E.: The Function of the Plasma Proteins, Physiol Abst., Balt., 1925, v, 439-476.
- <sup>14</sup>Lewinsky, J.: Beobachtungen über den Gehalt des Blutplasmas an Serumalbumin, Serumglobulin und Fibrinogen, Pflüger's Arch. f. d. ges. Physiol., Bonn, 1903, c, 611-633.
- <sup>15</sup>Foster, D. P.: A Clinical Study of Blood Fibrin with Observations in Normal Persons, Pregnant Women, and in Pneumonia and Liver Disease, Arch. Int. Med., Chicago, 1924, xxxiv, 301-312.

and the Formation of the "Crusta Phlogista" (Size, "Buffy coat") on the blood, Arch. Int. Med., Chicago, 1921, xxviii, 312-330.

17Krösing, E.: Das Fibrinogen im Blute von normalen Graviden, Wöchnerinnen und Eklamptischen, Arch. f. Gynäk., Berl., 1911, xeiv, 317-331.

Nasse, H.: Das Blut der Schwangeren, Arch. f. Gynäk., Berl., 1876, x, 315-355.
 De Wesselow, O. L. V.: Some Chemical Observations on the Toxemias of Pregnancy, Jour. Obst. and Gynaec. Brit. Emp., Manchester, 1922, xxix, 21-47.
 Wu, H.: A New Colorimetric Method for the Determination of Plasma Proteins.

Jour. Biol. Chem., Balt., 1922, li, 33-39.

<sup>21</sup>Rowe, A. H.: The Effects of Venous Stasis on the Proteins of Human Blood Serum, Jour. Lab. and Clin. Med., St. Louis, 1915-1916, i, 485-489.

<sup>22</sup>Foster, D. P. and Whipple, G. H.: Blood Fibrin Studies. II. Normal Fibrin Values and the Influence of Diet, Am. Jour. Physiol., Balt., 1922, lviii, 379-392.

23Linzenmeier, G.: Untersuchungen über die Senkungsgesehwindigkeit der roten Blutkörperehen, Arch. f. Gynäk., Berl., 1920, exiii, 608-632.

# THE DIFFERENTIAL DIAGNOSIS BETWEEN DIABETIC AND NONDIABETIC GLYCOSURIAS IN PREGNANCY\*

BY OLIVER H. STANSFIELD, M.D., WORCESTER, MASS.

THE necessity of distinguishing between diabetes mellitus and the more harmless glycosurias is always definite, and especially in pregnancy, where the possibilities for misfortune are so great in the event of diabetes not being recognized. During pregnancy, this distinction is sometimes very difficult. It was hoped that perhaps more information could be gained by reviewing cases of glycosuria of all origins, after a final classification. It is admitted that the final decision was not made in all cases without the lapse of time, in some instances not until after a succeeding pregnancy. The proved series is not large, but it may well form the basis for future work. Out of a total of 24 cases of glycosuria there were obtained for study, eight cases of diabetes and seven of glycosuria.

The diabetic cases usually offered less trouble in recognition than the nondiabetic glycosurias and are presented not only as a datum point to the consideration of the others, but also as having interest as examples of diabetes complicating pregnancy. As there is a possibility that the reader, applying his own criteria, may not agree with the final diagnosis, the cases are given in some detail.

The first diabetic patient was thirty-nine years old, at term in her seventh pregnancy. All previous pregnancies and deliveries had been normal. She was seen on March 20, 1921, the day after delivery, which had occurred about a month prematurely. She gave a history of edema of the legs for some days before labor, and for

<sup>\*</sup>It is a pleasant duty to express thanks to the obstetricians at Memorial Hospital. Drs. J. W. O'Connor, G. C. Lincoln, and J. E. Talbot, not only for permission to use records of cases cared for in common, but also for the cooperation necessary to this work.

100

the

ien

55.

eg-

ns,

od

rin

en

16

.6

p.

S

1

11

11

a day or two, nausea and vomiting. On March 13, glycosuria had been found. On March 20, there was marked glycosuria, with a positive ferric chloride reaction in the urine. The patient had livid lips and finger tips, and was hyperpneic. Alveolar CO<sub>2</sub> tension (Marriott) was 35 mm. Treatment was largely by forced intake of fluids and low carbohydrate diet. On March 28, after the acidosis had subsided, the blood sugar was 109 mg. per 100 c.c., one and a half hours after breakfast. The patient went home April 3, in good condition, on appropriate diet.

On March 19, 1923, the patient was readmitted in coma. She was given the 100 units of insulin available and restored to consciousness. Lobar pneumonia was then discovered. The patient lapsed again into coma, after a few hours, and died.

The second case was that of a woman of thirty, seen on February 28, 1922. Quickening had occurred on October 17, 1921. Sugar was found in the urine on February 28. Her mother and one brother had died of diabetes. Previous to the present pregnancy, in January, 1921, glycosuria was observed. Three previous pregnancies had ended in miscarriage. The patient was grossly overweight before the present pregnancy.

She was given a low carbohydrate diet and it was decided that, if pregnancy continued until the eighth month, to induce labor, as the surest method of getting a living baby.

On March 2, the urine showed a positive ferric chloride test, with alveolar  ${\rm CO}_2$  tension of 35 mm. Labor was induced on March 3, with resulting normal delivery. On March 7, the fasting blood sugar was 112 mg. On March 14, the blood sugar, one and a half hours after breakfast, was 122 mg., and, on March 23, 130 mg. In March, 1926, the patient was in good condition, taking care with her diet. The baby was doing well.

The third case occurred in an enormously fat woman of twenty-four, seen on April 18, 1924, because of pruritus vulvae and threatened abortion. In 1917 and 1918 glycosuria had been found. She had aborted at two months in 1917. In 1921, she had been delivered of a stillborn, full-term fetus. Since then, she had had four miscarriages. When seen, there was slight vaginal bleeding, with about a two months' pregnancy. On April 19, the fasting blood sugar was 204 mg. The patient aborted on April 19. Up to October, 1924, on restricted diet, she was free from glycosuria, and lost some weight, but another miscarriage occurred then.

The fourth diabetic case was that of a woman of twenty-seven, admitted on November 17, 1924, because of glycosuria. For eight years she had had pruritus vulvae. She had lost 25 pounds of weight during the year. She had been pregnant nine times, with four children living. She had had two misearriages and one stillbirth. There was no family history of diabetes.

The patient was three and one-half months pregnant. Glycosuria without keto nuria was found, after admittance. The fasting blood sugar was 200 mg. After instruction as to diet, the use of insulin and the testing of urine, the patient was discharged to Out-Patient observation on December 3, 1924. Readmission occurred on February 2, 1925, because of marked glycosuria and weakness, following a heavy cold. At this time, the fasting blood sugar was 370 mg. During this period of observation it was noted that diacetic acid was apt to be found in the urine, although sugar was absent. On February 11, 1925, she was discharged to the Out-Patient department.

Final admission on March 9. No glycosuria. The fasting blood sugar was 113 mg. A steadily increasing ketonuria was present, not controllable by increase of earbohydrate in the diet and greater dosage of insulin. On March 19, the fasting

blood sugar was 101 mg., and 94 mg. on April 2. On April 10, labor was induced, about a month before term, because of apparently impending fetal death. As a pre liminary to labor, rectal instillations of glucose solution, with appropriate amounts of insulin were given subcutaneously. Labor was normal, and after delivery, keto nuria disappeared rapidly, and food tolerance rose greatly. Mother and baby were discharged in good condition on April 24, 1925.

The fifth case occurred in a primigravida of twenty-eight, admitted on May 23, 1923, because of glycosuria. There had been no symptoms suggesting complications. Blood sugar, three hours after breakfast, was 168 mg. On appropriate diet, the glycosuria disappeared, and on May 25, the fasting blood sugar was 98 mg. The patient was discharged to follow the diet at home. When readmitted in labor on August 8, she stated that glycosuria had been found frequently. She was delivered of twins on August 9. On discharge, she was sugar free. On April 3, 1924, she was readmitted to the medical service with the history of a gradual loss of weight over three months, and polyuria and thirst for one month. There had been no restriction of diet. Sugar had been found in the urine two days before admission. The subsequent course of this patient has been that of a diabetic, requiring a moderate amount of insulin to utilize carbohydrates, with two attacks of acidosis, induced by acute respiratory infections.

The sixth case of this group occurred in a woman of thirty-three, admitted on December 26, 1924, two and a half months pregnant. She had been pregnant three times before, the third pregnancy ending in a stillbirth, in August, 1921. Glycosuria had been found immediately after this delivery. Four months before admission, pruritus vulvae had developed, but had been relieved by diet. Her father had died of diabetes mellitus. Glycosuria was found after admission. The fasting blood sugar was 160 mg. After treatment and instruction, the patient was discharged on January 6, 1925.

She was readmitted on February 5, with vaginal bleeding, which had begun two hours before. She stated that she had found sugar in the urine on only two days since discharge. During this stay, no glycosuria was detected, and on February 12, the fasting blood sugar was 84 mg. She was again discharged on February 14.

On June 16, she was admitted in labor and was delivered normally. Her food tolerance increased after delivery, and for three months she was able to nurse her baby. Since weaning the child, she has been able to gct along quite well without insulin.

The seventh diabetic case was in a woman of twenty-eight, pregnant at term for the third time, seen on January 21, 1920. The two previous pregnancies had been entirely normal. The patient's mother and two of her mother's sisters were diabetic. The patient was delivered on the day of admission, after precipitous labor. Glycosuria was absent on admission and on the following day, but was found on January 23. A glucose tolerance test on January 24, gave this result: Blood sugar, fasting, 180 mg.; one hour after taking 75 gm. glucose, 540 mg.; two hours after glucose, 320 mg.

After instituting diet, the patient remained sugar free until discharge on February 10. On March 5, blood sugar two and a half hours after a meal was 240 mg. After further readjustment of diet, no sugar was found in the urine until May 4. The patient then dropped from sight.

The last diabetic case, a primigravida of twenty-seven, was admitted on January 17, 1921, about eight months pregnant. Menstruation always irregular, with intervals varying from six weeks to four months. She was apt to have severe nosebleeds during the longer periods of amenorrhea. The patient was somewhat obese, with a

florid complexion. Blood pressure was 180/114. Glycosuria was present. The blood total nonprotein nitrogen was 36 mg., and blood sugar, fasting, 125 mg. After treatment and instruction, she went home.

Readmission on February 17. The patient then looked ill. Blood pressure was 170/108; the heart sounds were weak. There was marked edema of the legs; also retinal edema. About two hours after admission, she sustained a short clonic convulsion, so that delivery was promptly undertaken. The fetus was dead. Following delivery, the patient recovered so that by March 4, the day of discharge, the blood pressure was 134/90. Sugar occurred in the urine on February 28, only.

The later history of this patient is that as long as she kept to her diet, no glycosuria appeared. A miscarriage at six weeks took place in December, 1921. In November, 1922, she had not lost weight. Her blood pressure was 182/110, and blood sugar one and a half hours after a meal was 150 mg.

d

The next series of cases is made up of the nondiabetic group, of which the first occurred in a woman of twenty-six, pregnant for the fifth time, admitted on December 14, 1921. Three children were living. She had had no miscarriage. No glycosuria during these pregnancies. On December 12, glycosuria had been found by the Out-Patient staff. She had no thirst, polyuria, or increased appetite. On full diet, the glycosuria test varied (over several days) from none to a heavy reduction. On December 17, the fasting blood sugar was 169 mg., and 250 mg., two hours after breakfast. On December 20, with reduced diet, the blood sugar was 162 mg. She was discharged on a restricted diet, on December 21. On February 3, 1922, she was readmitted in labor, and was delivered and recovered normally, except that in two days, a slight sugar reduction was found.

On December 8, 1925, the patient was again admitted, pregnant, with blood pressure 195/130, with edema of the feet, albuminuria, and with hyaline casts in the urine. The blood nonprotein nitrogen was 29 mg., and the fasting blood sugar, 64 mg. on December 10. Glycosuria had not been found during antenatal observation. Spontaneous delivery took place on December 22. Discharge was on January 5, 1926, with blood pressure 130/80. Glycosuria did not appear throughout this period of observation.

The second case of glycosuria was that of a single woman of twenty-four, admitted in labor after her first pregnancy on January 3, 1922. She had no knowledge of previous glycosuria. The pregnancy had been normal. The blood Wassermann was strongly positive. Glycosuria was found on admission. Labor was long, and the fetus stillborn and premature. On January 7, blood sugar one hour and a half after breakfast was 175 mg. After January 4, when glycosuria was found for the second time, no sugar was detected in the urine up to discharge on January 22. In April, 1925, the patient was quite well, and putting on much weight, it is stated by her doctor.

The third glycosuria case occurred in a woman of twenty-seven, admitted in labor at term of her second pregnancy, on June 9, 1923. The first pregnancy had been normal. At the fifth month of the second pregnancy abortion was threatened. Shortly after this, glycosuria had appeared. The fasting blood sugar had been determined then as 95 mg. Delivery of a dead fetus was accomplished on June 9. No glycosuria was found during the puerperium. The patient was discharged on June 29.

In 1924, she suffered considerably from maxillary disease. In March, 1926, delivery occurred, after her third pregnancy, which had been normal to within five days before delivery. At this time, blood pressure had risen to 180/110, and, as no improvement in symptoms occurred under treatment, labor was induced. After deliv-

ery, recovery was rapid. No glycosuria was found during this period of observation nor, it should be stated, during the time between the second and third pregnancies,

The fourth case was that of a woman of thirty-eight, pregnant for the first time, admitted on March 22, 1923. Quickening had occurred November 30, 1922. Some seventeen years before, she had had much upper respiratory trouble and otitis media, with albuminuria.

The patient complained of headache; there was edema of the feet and hands. The heart was not enlarged, but was rapid (100). An aortic systolic murmur was present. Retinal edema was noted. The urine was negative.

On March 30, glycosuria was found, and frequently but not constantly thereafter, until April 8. After April 8 until discharge on May 10, no glycosuria appeared. On April 6, the fasting blood sugar was 139 mg. The patient was delivered by cesarean section, because of the cardiac condition on April 30. The baby died. On July 24, and August 14, no sugar was present in the urine.

On September 25, 1924, the patient was again delivered by cesarean section. During this pregnancy and puerperium, no glycosuria occurred.

The fifth case of nondiabetic glycosuria was very interesting. The patient, thirtycight years old, was admitted in her third pregnancy on May 27, 1924, because of
glycosuria. Her two other pregnancies had been normal. Three weeks before entry,
pain over the pubes developed; increased frequency of urination with burning and
pain had been present throughout pregnancy. About the seventh week of this pregnancy, the patient had had several furuncles on her back. These healed rapidly and
did not recur. Epistaxis had been frequent during this pregnancy. For some weeks
before admission, the patient had been salivated. Quickening was felt May 13.

The ptyalism was marked. Three examinations of urine on the day of admission showed sugar. Glycosuria was present also the next day but, except on June 5 and 8, was absent until discharge on June 11. On May 28, the fasting blood sugar was 83 mg.; on May 29, 69 mg. The patient had been given atropin (grain  $\frac{1}{100}$ ) three times on May 28. This drug was then given twice each day from May 29 until June 2, on which day but one dose was given. On June 6, fasting blood sugar was 80 mg. Salivation had ceased on discharge.

Later observation showed that on liberal diet, there was no glycosuria, up to August 5. The effect of ptyalism on food intake may have had some influence in this case.

The sixth case was a primigravida of thirty-three, admitted on April 10, 1921. Quickening noted on December 18, 1920. There had been much vomiting throughout pregnancy. Edema of the legs present during the later months. No abnormal urinary findings. Normal delivery April 10. On April 12, glycosuria was detected, persisting till April 15, after which none appeared. On April 13, fasting blood sugar was 120 mg. Discharged April 15.

A normal delivery in July, 1922, after a pregnancy characterized by marked edema. During the pregnancy, no glycosuria was found, but on the fifth day of this puerperium, a slight sugar reduction was noted. After this, there was no urinary abnormality up to March, 1926.

The last of the glycosuria cases was a woman of thirty-three, admitted in her first pregnancy on November 21, 1922. Term was estimated as January 13, 1923. Pregnancy had been normal until two days before entry, when the patient had vomited. She had been thirsty for some days and had noticed pruritus vulvae.

A heavy glycosuria was found upon admission. On November 14, the fasting

blood sugar was 45 mg., and 68 mg., one and a half hours after breakfast. The urine, however, was negative on November 14, and remained so until discharge on December 29.

A comparison of these two groups of cases shows very definitely that it is impossible to divide sharply the diabetic from the non-diabetic patient, whether by history, physical status or blood-sugar reactions. The passing of time seems to be the final diagnostic factor.

Included in the second group are examples of nondiabetic glycosuria, with a temporarily (at least) high blood sugar, and of glycosuria with low blood sugar. It may be that the type with hyperglycemia is not very familiarly known, for the literature reviewed includes but one mention of this.

It is obvious, as Schenck remarks, that extreme caution must be used in the treatment of these cases, and that it is wisest to treat them as diabetic, until observation shows them to be nondiabetic.

Hypoglycemia seems to be harmless, yet there is a certain deceiving sound of finality to the expression "renal glycosuria." Since, as a matter of fact, we know little about the origin of this type, "of unknown origin" would seem to be a better characterization. At least, a confession of ignorance may tend toward carefulness.

NOTE.—It is the habit to subject urine, found for the first time to contain sugar, to both fermentation and phenylhydrazine tests. In all the eases under present discussion, glucose was found as the reducing body.

## REFERENCE

Schenck, S. B.: Am. Jour. Obst. and Gynec., October, 1924, viii, 457.

# INJURY OF THE CERVIX UTERI AND ITS INTERMEDIATE REPAIR

By Norman Harris Williams, M.D., Los Angeles, Calif.

(From the Department of Obstetrics, Good Samaritan Hospital, Los Angeles, Calif.)

PROBABLY no part of the body is as consistently neglected surgically as the cervix uteri following injury in the process of labor. Indeed, any recent laceration elsewhere in the body is a recognized indication for surgical treatment, whereas, in most instances, the cervix receives none.

This inconsistency in surgical judgment is difficult to explain. It may be in part due to the noncommittal attitude of the authors of textbooks on obstetrics, who advise suture of cervical lacerations only in case of hemorrhage. Occasionally, there will be found in textbooks recognition of individuals who have recommended surgical care of one kind or another, but support of these recommendations is lacking.

Again, the medical schools do not impress in their teaching the advisability of repair until after the pathology has caused the patient symptoms for which she seeks relief. Many of their students are graduated without the realization of the amount of pathology present in the average cervix following parturition. Unfortunately many who practice obstetrics never really know, because of a failure to perform thorough postpartum examinations. This, I believe, is less a matter of willful or intentional neglect than it is the result of faulty teaching, custom or habit.

Then, too, there may be those who, following examination and the discovery of injury, hesitate to admit to their patients the presence of "tears" for fear of criticism, for often "tears" are considered by the laity the result of improper care. It may take some time for the pendulum of public opinion to swing to the point where no surgeon will be held responsible for getting lacerations, but all surgeons will be held responsible for neglecting their repair.

Gynecologists are often called upon to relieve morbidity and distressing symptoms referable to lacerations of the cervix of longer or shorter duration. The patient complains of general disability dating from the birth of her baby; often there is an irritating leucorrhea; backache persists; there is heaviness from the congested pelvis; the uterus remains subinvoluted; there may be history of repeated spontaneous abortions following the first pregnancy; possible sterility;

and, last but by no means least, symptoms of malignancy which are superimposed upon the pathology for which the cervical laceration presumably was responsible. Many carcinomata of the cervix are based upon old cervical tears.

In a study of two hundred recent deliveries, eighty-six per cent of all cases have cervical laceration; eighty-five per cent of these were bilateral. The record shows also that eighty per cent of all primiparae have cervical injury.

For convenience of reference the lacerations have been divided as nearly as possible into three degrees. The first degree is that which injures the mucous membrane, and does not affect the body of the cervix. The second degree laceration injures the body and extends upwards to the angle of the fornix. This, in turn, is divided into three degrees depending upon extent, namely, slight, moderate, and extensive. The third degree laceration extends into the broad ligament.

 $\mathbf{d}$ 

16

S

ıl

S

6

Of the eighty-six per cent cases showing laceration, fifteen per cent were first degree and seventy-one per cent were second degree, the great majority being moderate in extent.

An effort has been made to draw conclusions from the records that might determine to what extent certain factors might play in the character and extent of the cervical lacerations. In a study of this kind only primiparae are considered, for injuries in multiparae are apt to have their origin in previous labors. Then, too, it is difficult to draw hard and fast conclusions, for in any given case there is always a combination of factors present.

- (1) The Age of the Parturient: The primiparae, fifty in number, varied in age from nineteen to thirty-nine years. No relation seemed to exist between their age and their injury in spite of the prevalent idea that older women receive more extensive injury.
- (2) Occipital Presentations: In occiput anterior positions the lacerations seem to be fairly equally divided between the side on which the occiput presents and the opposite side, with possibly slightly more extensive lesions on the presenting side.

In occiput posterior positions all the cases had moderate second degree lacerations,—the side having the more extensive tear may or may not be the presenting one.

(3) The Membranes: In cases where the membranes remained intact until dilatation was complete, or at least well advanced, eighty-eight per cent showed second degree laceration, one-half of which were moderate in extent. There was no tear in twelve per cent. Of the cases in which the membranes either ruptured before the onset of labor or before dilatation had progressed, forty-two per cent showed

first degree laceration, and there was no tear in 28 per cent. There were second degree tears in 30 per cent, thus showing a tendency for less injury in dry labors.

(4) Length of Labor: Labors under ten hours resulted in no tears in 20 per cent; first degree tears in 20 per cent and second degree tears in 60 per cent.

In labors of over twelve hours there were none without tears; 30 per cent had first degree tears and 70 per cent had second degree tears, showing a tendency for more extensive injury in longer labors.

- (5) Sedatives: Though the records are not sufficiently detailed to determine the effects of sedatives upon cervical injury there is strong indication that opiates, especially the twilight analgesia, reduce the injury by considerable degree. On the other hand, the use of pituitrin may increase the amount of injury. In this series the use of this drug before deliveries is so infrequent that the records are unreliable.
- (6) Instrumentation: Instrumentation or manipulation of any sort doubtless increases the injury. In most cases manual dilatation means manual tearing. Forceps, as a rule, produce tears. In all the forceps cases there was none with less than a moderate second degree tear. Dilating bags usually increase the injury, especially if traction is made upon them. Version and extraction result in extensive tears. In all these cases there were lacerations, none of which was less than moderate second degree.
- (7) Size of the Baby: The size of the baby seems definitely to influence the amount of injury. Babies whose suboccipitobregmatic circumference was 30 cm. or less, produced tears usually of not more than first degree; on the other hand, if the diameter was greater than 30 cm. there were invariably tears of second degree, either moderate or extensive.

If allowed to care for themselves most of these lacerations heal with the formation of considerable scar tissue, with erosion of the mucous membrane, with cystic degeneration of the cervical tissue, general hypertrophy and a gaping os which induces chronic infection of not only the cervical glands, but the endometrium as well. Often these conditions require surgical treatment for their cure.

To avoid these conditions the question naturally arises as to the most advantageous time for repair. Among others Emge has advocated repair immediately following delivery. His results are reported satisfactory in primiparae, but less so in multiparae with hypertrophy and disturbed cervical blood supply. The distortion and lack of tone of the cervical tissue following delivery, the interference from uterine bleeding, the difficulty of determining the extent of actual injury, the uncertainty of accurately approximating the torn edges

and the tendency for sutures to fail to hold in the edematous, almost jelly-like tissue are factors which tend to make the results of the immediate repair less perfect.

r

e

0

g

16

in

is

е.

rt

ns

DS

P.

de

ıll

te

n-

r-

an

30

or

eal

he

10,

on

en

he

v0.

ed

er-

ek

m

1al

res

At the eighth to tenth day postpartum, however, the cervix has regained much of its tone, the exact extent of injury can be definitely ascertained, the field of operation is less hemorrhagic, and the approximation of the clean, freshened edges can be accurately obtained. Hirst recommends suture on the fifth or sixth day. Titian Coffey for the past sixteen years has made it his practice to repair the cervix routinely (except, of course, in the presence of infection) on the ninth day postpartum. Having had an opportunity of observing his results over a considerable period of time, I have been convinced that intermediate repair is the proper means of reducing much maternal morbidity, and have therefore, during the past four years routinely repaired all injured cervices on the ninth day postpartum. The technic of the operation is as follows:

The patient is given an enema two hours before the operation and the bladder is emptied. Shaving is usually unnecessary inasmuch as it has been done at the time of delivery. An H. M. C. No. 1 tablet is given hypodermically one half hour before the operation. The patient is placed in the lithotomy position with the buttocks well over the edge. She is then cleansed with green soap and water. A lysol douche, under low pressure, is given, following which the patient is draped in the usual manner. A trivalve vaginal speculum is introduced and the cervix brought into view. A curved single-toothed tenaculum is placed into the center of the upper lip, a straight one into the lower lip in the center. These are used for traction as well as for landmarks. The trivalve speculum is then removed and a light, weighted speculum introduced and the cervix drawn forward. The cervix is then anesthetized with 2 per cent novocain in its anterior portion, but particularly behind the angles of the laceration. With cervical seissors the edges of the lacerated area are then freshened by the removal of the granulation tissue; cysts are removed, as well as small irregularities along the torn surfaces. It is seldom necessary to remove much, if any, of the true cervical tissue. To insure raw surfaces the freshened edges are finally curetted.

The laceration, on either or both sides, as the case may be, is closed by a continuous, interlocking suture of No. 2 forty-day chromic catgut, care being taken to introduce the posterior suture well behind the angle of the laceration, thereby avoiding sinus formation. Anteriorly, the suture on either side is introduced close to the tenaculae. When the sutures are tied there is left a small os which easily admits a uterine sound. The speculum is then withdrawn and the cervix pushed well back in the vaginal yault to bring the fundus into proper position.

If perineal sutures have been introduced at the time of delivery, the cervical repair is completed before the removal of these sutures.

Aftercare: Following the cervical repair the patient is returned to her bed and allowed to sit up against a back-rest, to facilitate drainage. That night and each morning and night thereafter she is instructed to remain in the knee-chest position for periods of five minutes each. The day following the operation she is allowed up in a chair an hour, and each day after the time is increased. She is permitted to walk on the twelfth day postpartum and returns to her home from the hospital on the fourteenth day.

Very infrequently there is a moderate retention of the lochia for thirty-six to forty-eight hours, as is indicated by slight rise of temperature and absence of discharge. If this condition persists and is not corrected by the upright position, two or three doses of ergot will suffice to restore the normal flow.

The results of this procedure, both anatomically and subjectively, cannot be overestimated. The patients return to the office for their final examination six weeks after confinement. The cervix is then well healed, scarcely any scar is visible, the os is small and round, admitting only the tip of a uterine sound; there is absence of any eversion or erosion of the mucous membrane; the discharge if any, is a slight mucoid one which soon disappears altogether. The fundus shows marked involution and a restoration to a normal, nonpregnant state,—in fact, in many instances, it is difficult to believe that there has been any disturbance incident to parturition.

Subjectively, almost without exception, the patients show none of the symptoms or morbidity common to the parturient, such as failure to regain strength, nervousness, mental depression, backaches and feeling of heaviness and sagging in the pelvis.

Naturally, the question arises as to the effect of these repairs upon subsequent labors. In this series there are thirteen cases which had previously been repaired. The average duration of labor in these was eight and a half hours; there was one having a first degree tear of slight extent and twelve having second degree tears of moderate extent. All these were repaired following their last confinement. In fact, a cervix may be repaired repeatedly inasmuch as none of the true cervical tissue is sacrificed in the repair by the secondary operation.

In summary, we have a procedure which restores the injured cervix on the ninth day postpartum to a condition approximating that before injury. It entails no danger to the patient nor does it prolong her period of convalescence. It reduces to a minimum the morbidity often observed following confinement. It minimizes the occurrence of the familiar chronically infected cervix and endometrium. It doubtless is a definite prophylactic measure against malignancy of the uterus.

1052 WEST SIXTH STREET.

# SO-CALLED ECLAMPSIA WITHOUT CONVULSIONS SUCCESSFULLY TREATED WITH INSULIN, WITH THE REPORT OF A CASE

to

on,

ly,

eir

en

nd, ny

ny,

lus

int

ere

of

ure

ind

on

nad

was

of

ate

In

the

ary

vix

ore

her

lity

nce

It

of

BY WILLIAM THALHIMER, M.D., MILWAUKEE, WISCONSIN

THE classification of the so-called toxemias of pregnancy is generally admitted to be unsatisfactory since the causes of these conditions are still obscure. Because of this, it seems of interest to report this case, which presented a very unusual syndrome with definite abnormalities discovered with aid from the laboratory, and with successful response to the indicated treatment. The patient seemed to belong definitely to the eclamptic type but could have been classified equally well, in all probability, as either eclampsia without convulsions or pre-eclamptic nephritic toxemia. The best term for this patient's condition undoubtedly would be one which described the findings, for example: "a patient, para ii, near term, with a rapid development of coma, a high blood-sugar level, acidosis, nonprotein nitrogen retention in the blood and nephritis and death of the fetus in utero." This is too long, of course, and would lead us nowhere.

This report can be made more interesting if the reasons for the treatment are given at the periods during the patient's progress that the therapy was decided upon. In this way the difficulties that presented themselves can be seen.

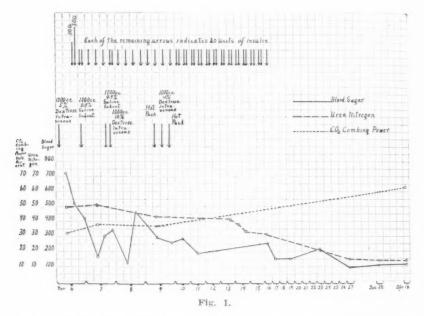
Mrs. H., aged thirty years, has one four-year-old, healthy child. This previous pregnancy, labor and puerperium were perfectly normal. Her past and family history reveal nothing of significance.

During her second pregnancy she was under the care of Dr. R. W. Roethke, and systematic observation, including urinanalysis and blood pressure determinations, showed no abnormality of any sort. Within about two weeks of term she developed small painful hemorrhoids and, probably to some extent to avoid the pain of bowel evacuations, allowed herself to become constipated. Difficulty in defecation continued for about ten days in spite of various laxatives. On October 30, 1925, there was a small exceedingly hard stool following the use of a soap stick, and she felt relieved. October 31, she still felt fetal life and examination by Dr. Roethke revealed normal fetal heart tones. November 1, a bowel movement followed an enema. She felt badly November 3 and remembers very little of what happened; from the night of November 4 she remembers nothing—she was comatose from then on. In the afternoon of November 5 she was admitted to Mount Sinai Hospital.

On admission: T. 99.8°, P. 120, R. 28, B. P. 128/85; patient in coma; evidently acutely ill. She was disoriented and unable to give any definite information at the time of examination. She answered questions poorly and then fell into a stupor. Face and skin flushed. Breath had a sweetish odor. Breathing rapid and deep. Pupils equal and reacted to light. The eye grounds showed congestion

of the blood vessels. Nose obstructed and full of discharge. Teeth normal, mouth full of débris. Tongue coated. Membranes dry and red. Respirations deep and regular. Lungs clear and resonant. Heart rate and rhythm are regular. Pregnant uterus firm and hard. Occasional contractions. Fetal heart tones not heard. The blood pressure remained normal during the entire illness. That night a proctoclysis of glucose was given but none was retained. The patient was unable to take nourishment. An enema caused a good evacuation. No urine could be obtained for examination.

November 6. The patient's condition remained the same but the urine showed a heavy reduction with 3 drops of Fehlings', and acctone and diacetic acid ++++, albumin ++++, with hyaline and finely granular casts. Unfortunately a blood sugar determination was not made at this time.



At 11 A.M. an intravenous injection of 1000 e.e. of 5 per cent glucose solution was started which ended at 12:30 P.M; 15 units of insulin were given hypodermically. At 5 P.M. the patient was seen in consultation with Dr. Roethke. She was in an almost complete coma, pale, evidently dehydrated, eyes sunken, pulse small and rapid, abdomen distended to the size of a full-term pregnancy, but otherwise her physical examination showed no abnormality. There was no edema and the capillary circulation was good. The breath had a marked acetone odor. The nature of the patient's breathing was not noteworthy except that it was not of the Kussmaul air-hunger type.

The presence of sugar in the urine (before the intravenous glucose administration) made one consider the possibility of a sudden onset of diabetes and diabetic coma. The patient's appearance did not suggest diabetic coma; the absence of Kussmaul breathing and of glycosuria during the entire pregnancy was against it. If this was diabetes it was more sudden in its onset than the literature of diabetes, so far as I know it, has revealed. Still this had to be kept in mind. Even in the absence of edema this patient appeared to be suffering from a nephritic retention and my first impression, because of the glycosuria and the patient's

clinical appearance, was that this condition was a combination of a possible "acute" diabetes and nephritis, the latter possibly exaggerated by absorption from the dead fetus. This was given only the consideration of a clinical impression. The sequence of events: constipation, death of fetus, coma, ketosis, glycosuria and albuminuria was truly remarkable, and the explanation of the primary instigation of this chain of events was completely obscure. Intestinal stasis, ordinarily not of serious moment, even in advanced pregnancy, nevertheless seemed to have ushered in this serious and complicated condition. A blood examination performed immediately showed: blood sugar, 720 mg. per 100 c.c. (Benedict Method); blood urea nitrogen, 49.4 mg. per 100 c.c.; blood creatinine, 1.4 mg. per 100 c.c., and the CO<sub>2</sub> combining power, 32 vol. per cent (Van Slyke Method).

This blood was drawn five hours after the glucose injection, and because of this was difficult to interpret. A personal study of normal individuals, who were given more than twice as much glucose intravenously as this patient, was far enough along for me to know that in the absence of a disorder of carbohydrate metabolism, this patient's elevated blood sugar could not be attributed to the injection of 50 grams of glucose five hours previously.\* There was a considerable retention of urea in the blood, indicating that the impression of nephritis was justified. The blood plasma CO<sub>2</sub> combining power was low, not only lower than in normal full-term pregnancy but lower than is usually found in excessive vomiting of pregnancy with ketosis. It was not as low as one would have expected had this been diabetic coma, although its level did not rule out diabetes.

Treatment was started immediately as though the patient were in marked diabetic acidosis, deeply comatose and with complicating nephritis. It seemed that the most important element to control was the acidosis. Enemas were given also, to keep the lower bowel functioning. Induction of labor in the presence of this degree of acidosis would have been fraught with danger.

A large dose of insulin (Lilly) was given immediately, with further doses during the night. Thirty units were given at 7 P.M., 50 units at 9:30 P.M., 20 units at 12:30, 2:30, and 4:30 A.M. (140 units in 9 hours).

The blood-sugar level was followed during the night, and was 520 mg. per cent at 9:30 p.m., 420 mg. per cent at 11:30 p.m. and 160 mg. per cent at 8 o'clock the next morning (November 7). The urine sugar, acctone and diacetic acid decreased during the night and were absent at 8 a.m. The blood plasma CO<sub>2</sub> combining power increased to only 37.6 vol. per cent from 32 vol. per cent of the night before. During the night 1000 c.c. of normal saline were given by hypodermoclysis because of the evident dehydration. Digifolin, 1 c.c., was given hypodermically every four hours.

In the morning, November 7, the patient's condition made a better impression, her pulse was fuller and less rapid, but her comatose condition was the same. The ketosis had been controlled, the blood sugar was practically normal, and the acidosis improved, but the underlying etiology was still obscure. My recommendation to Dr. Roethke was, that the patient's condition had been improved as much as seemed possible and if the time were not utilized to empty her uterus, and relieve her of the possible toxic absorption from the dead fetus, the opportunity might be lost and never return. He induced labor by a cervical pack, at 11 A.M. He was prepared to use forceps and further reduce the strain on the patient, but after an easy labor, which did not injure the patient's condition, a normal delivery of a stillborn, somewhat macerated fetus occurred in seven and one-half hours, at 6:30 P.M. (The fetus showed no other abnormality and the placenta presented no lesions).

99 30

uth

and

eg-

ard.

roe-

to

ob-

wed

++.

gar

she small wise

t of strabetic

The

e of ainst re of mind.

nritic ent's

<sup>\*</sup>The Effect of Intravenous Injection of Glucose and of Glucose and Insulin upon Blood Sugar. To be published in Jour. Am. Med. Assn.

The chart shows, in detail, the laboratory findings, insulin and other therapy, etc. Twenty unit doses of insulin were continued at intervals of four hours during the day of labor and during the night following delivery. The nurses found it difficult to force the patient to take sufficient fluids, fruit juices, and carbohydrate by mouth, so normal saline was given hypodermically and 10 per cent glucose intravenously several times during the next few days. This was done, merely to be certain that the patient received enough fluid and carbohydrates. Several hot packs were also given. The patient's general appearance gradually improved, but the coma was practically unchanged for forty-eight hours after delivery, a marked hyperglycemia continued, and also a retention of urea in the blood. The insulin dosage was reduced to 20 units every six hours and was continued for eight days postpartum. The third day after delivery the patient came out of coma rather rapidly. From this time on she took large amounts of fluids, sweetened orange juice, carbohydrate foods, etc., and the excretion of urine increased. Carbohydrate foods were not limited, but the patient was purposely urged to take them.

Some hyperglycemia persisted until the eighth day after delivery, but on the seventh and eighth days marked diaphoresis occurred at intervals, and she felt extreme hunger before meals. We thought these occurrences were indications that the carbohydrate metabolism was approaching normal and were not surprised when a moderate degree of insulin shock occurred on the ninth day postpartum. Insulin was discontinued permanently, and the patient was placed on a diet of 2500 cal. (C. 100, P. 60, F. 200).

The remainder of the convalescence was uneventful and now, five months later, the patient's recovery seems complete. On an unrestricted diet she shows a normal blood-sugar value, alkali reserve, blood urea, urine, and normal blood pressure.

### DISCUSSION

In connection with this patient there are many data still to be desired, but those obtained seem to us to be of considerable interest and may be of value even beyond the interpretation of this case. Certainly, without the laboratory aid,\* we would have remained completely in the dark regarding the patient's condition. The course of the patient's recovery would seem to indicate that the relief of her acidosis and the control of her abnormal carbohydrate metabolism with insulin contributed essentially to her recovery. The ketosis was eliminated in twelve hours after energetic insulin therapy was started. This result can hardly be attributed to the previous small dose (50 grams) of glucose given intravenously or to the one subcutaneous injection of 1000 c.c. of normal saline. This patient's condition seems to be unique. This impression may have been received simply because other similar syndromes have not been sufficiently studied, although it is now recognized that laboratory assistance is proving to be of more and more value in studying the so-called toxemias of pregnancy.

No claim is made that this patient suffered from eclampsia. Be-

<sup>\*</sup>The efficient cooperation of Miss Weinert, in the laboratory, and of the nurses and authorities of Mt. Sinai Hospital cannot be too gratefully acknowledged,

cause of lack of a better term, her condition was referred to as "so-called eclampsia without convulsions," which it undoubtedly would have been called if we had not had the laboratory findings. This case was of particular interest to me because of my previous interest in the treatment of postoperative acidosis and excessive vomiting of pregnancy with insulin.

This work caused me to suggest the possible usefulness of insulin in treating genuine eclampsia, and one such patient was treated with insulin, along with other methods, and recovered. The recent report of Stander of a series of eclamptics treated with insulin is very significant, and his data are very suggestive. The blood sugar of my patient was much higher than he found in his patients with true eclampsia. The possibility of convulsions alone causing a raised blood sugar must be borne in mind, but our patient had no convulsions. The cause of the temporary abnormality in carbohydrate metabolism, diabetic in type, is a complete mystery to me, and the most unusual event of all. There was no evidence of thyroid abnormality, but no basal metabolism studies were made, hence this must be kept in mind as a possible explanation.

The entire field of the so-called toxemias of pregnancy is still filled with obscurity and confusion, and for that reason is an excellent one for investigation. Statistics as to percentage of recoveries after this or that type of treatment are not as important as recognition of a response in an expected manner to a given therapeutic agent, in the direction of the physiologic action of this agent. It is this kind of response which Stander's data demonstrated to follow administration of insulin, and which makes his data and results important.

Much still remains to be learned, not only of the action of insulin, but even of the action of large intravenous doses of glucose. This study will have to be made in connection with both normal and abnormal human beings, as results with animals and with humans are not strictly comparable. Some results on normal individuals given intravenous injections of glucose, both with and without insulin, have been published elsewhere recently.\* Further studies of patients with so-called toxemias of pregnancy are progressing and will be published at some future time when sufficient data have been accumulated.

## REFERENCES

Stander, H. J.: The Use of Insulin in Eclampsia, AMER. JOUR. OBST. AND GYNEC., 1925, x, 823.

Thalhimer, W.: Jour. Am. Med. Assn., 1924, lxxxii, 696; Surg. Gynec. and Obst., 1924, xxxix, 237; Jour. Am. Med. Assn., 1923, lxxxi, 383; Am. Jour. Obst. And Gynec., 1925, ix, 673.

COLUMBIA HOSPITAL.

ome of her ism was

y,

ng it

ite

in-

to

out

ted

lin

ght ma

ned

ar-

ake

the

felt hat

hen

alin

cal.

ter,

be

est

ase.

ted. (50

tion iply ied,

ving s of

Be-

urses

<sup>\*</sup>Loc. cit.

# ENDOCERVICITIS\*

A CLINICAL STUDY OF 1,039 CASES, MANY TREATED WITH THE CAUTERY

By Lynn L. Fulkerson, A.B., M.D., F.A.C.S., New York, N. Y.

A CLINICAL study of the records and the case histories of the patients examined in the Gynecology Department of Cornell University Medical School between November 1, 1921, and March 15, 1926, has been made in order to establish the incidence of endocervicitis in the gynecologic patients. The histories, symptoms, treatment, and complications in the cases treated during the same period have been analyzed to establish the age incidence, the marital state, the cardinal symptoms, the etiologic relation to concomitant complicating conditions, the causal relation to abortion and sterility, the effect on ovarian function as evidenced by variations in menstruation, the incidence of gonorrhea and of cancer of the cervix in endocervicitis, and the comparative values of the different methods of treatment. The cases responding to the follow-up letter have been compared as to the results obtained by the various methods of treatment and as to the effect on sterility and on subsequent labors.

Incidence.—During the period under consideration 6,483 women were examined and the diagnosis of cervicitis or endocervicitis was made in 2,150 of them, a percentage of 33.16. The deduction cannot be made that one-third of all women have inflammatory disease of the cervix, for admittedly the patients seen in a diagnostic clinic show an incidence greatly in excess of that among women in general. The figures are of value, however, in proving that the disease is the most common that the gynecologist is called upon to treat.

Age of Incidence.—Many of the 2,150 women with endocervicitis were admitted to the department at the request of family physicians for diagnosis alone and only 1,039 were treated. Of this number an age analysis by decades showed the following: 28 were between ten and twenty; 405 were between twenty and thirty; 406 were between thirty and forty; 139 were between forty and fifty; 32 were between fifty and sixty; 9 were between sixty and seventy. It appears that 78 per cent of the cases were between twenty and forty years of age. The youngest patient was seventeen and the eldest sixty-nine. The average age was thirty-three and one-half years.

The age of incidence indicates that the disease is most common during the childbearing period and becomes comparatively infrequent

<sup>\*</sup>Presented at a meeting of the New York Obstetrical Society, May 11, 1926.

after the menopause in contradistinction to cancer, in which the average age is forty-five and one-half years.1

Single or Married State; Parity.—Of the 1,039 cases, 959, or 92.3 per cent, were married, while 80, or 7.7 per cent, were unmarried. Also 695 women had borne from 1 to 13 children, and 382 had had from 1 to 15 abortions or miscarriages. Of those who had aborted, 73 had never borne children, leaving a total of 191 married women who had never become pregnant, or 19.9 per cent of sterile marriages. The preponderance of married women who had borne children or had miscarried, 80.1 per cent, together with the small number of single women in the series, supports the conclusion that the traumatism of labor or abortion is the chief factor in producing the disease and makes it appear highly improbable that gonorrheal infection is as frequent an etiologic factor as commonly supposed.

Symptoms.—The most usual symptoms complained of were leucorrhea, backache, abdominal pain, menstrual disturbance, urinary symptoms, headache, sterility, bearing down or dragging sensation, dyspareunia and a heterogenous collection of other symptoms which, except for a few cases of itching vulvae and bleeding at intercourse, did not have even a remote relation to cervical inflammation.

Of the 1,039 eases, 770, or 74.1 per cent, complained of leucorrhea; 380 women, or 36.5 per cent, had backache; 468, or 45 per cent, had menstrual disturbance; 299, or 28.7 per cent, had urinary symptoms; 316, or 30.4 per cent, had abdominal pain; 61, or 5.8 per cent, came for sterility; 67, or 6.4 per cent, had headache; 56, or 5.3 per cent, had a fallen womb, bearing down or dragging sensation; 21, or 2.0 per cent, had dyspareunia.

An analysis of the chief complaint brought out several points of interest. Most women gave two or more symptoms as of first importance. In 283, or 27.2 per cent, of eases leucorrhea was emphasized; in 219, or 21 per cent, backache; in 316, or 30.4 per cent, abdominal pain; in 61, or 5.8 per cent, sterility; in 67, or 6.4 per cent, headache; in 56, or 5.3 per cent, dragging, bearing down or fallen womb; in 44, or 4.2 per cent, urinary complaints; in 176, or 16.9 per cent, menstrual disturbance; in 204, or 19.6 per cent, the complaints were irrelevant.

It appears natural that the percentage of leucorrhea should drop while the percentages of the symptoms expressing physical suffering should rise. It is worthy of note that the patients complaining of abdominal pain or sterility always made it the chief complaint. Most of the 204 with other than gynecologic symptoms were referred from other departments of the clinic in order to establish a cause for systemic disease.

Diagnosis.—The clinical diagnosis of cervicitis or endocervicitis was made by direct inspection of the cervix through the vaginal speculum.

A swollen, red, ulcerated or eroded area adjacent to the external os or the presence of nabothian cysts, either with or without muco-purulent exudate and hypertrophy, was considered as establishing the diagnosis.

The presence of mucus in the cervical canal was not considered of itself indicative of endocervicitis in the absence of apparent inflammation, erosion or nabothian cysts; nor was laceration with ectropion considered indicative of inflammatory disease in the absence of erosion or cysts. Smears from the cervix were taken in 129 of the more acute cases. Only 5 of these were positive for the gonococcus, although 20 patients gave a history of probable gonorrheal infection; one of these had a positive smear, a proved incidence of 0.48 per cent, or from history 2.3 per cent. Two cases of primary syphilis with chancre of the cervix, an incidence of 0.19 per cent, were excluded by dark-field examination. No tuberculosis of the cervix was found.

Complications.—The most frequent gynecologic condition coincident with inflammatory disease of the cervix, exclusive of laceration or evidence of previous traumatization of the cervix itself, which was observed in every parous woman, as well as those who had aborted, was found to be uterine displacement, which existed in 460 women, 44.2 per cent; the number of patients with lacerated perineum, cystocele or rectocele, or two, or all three of these conditions, was 405, or 38 per cent of cases; patients with adnexal disease numbered 214, or 20.5 per cent of cases. As already stated, five smears from the cervix were positive for the gonococcus. The urinary tract conditions found consisted of 117 cases, or 11.2 per cent, including 49 of relaxed vesical sphineter, 4.7 per cent; 39 of cystitis and trigonitis, 3.7 per cent; 12 of urethritis, 1.15 per cent; 8 of renal ptosis, 0.76 per cent; 8 of pyelitis, 0.76 per cent; one of renal calculus, 0.09 per cent. Other complications included 47 cases of cervical polyp, 4.5 per cent of cases; 24 of fibroids, 2.3 per cent of cases; and 10 of vaginitis, or 0.96 per cent.

The occurrence of uterine displacements coincident with cervical inflammation in so large a proportion of eases, leads to the conclusion that the cervix of the displaced uterus is more prone to infection than the cervix of the normally suspended uterus; that when infection is present it is less likely of spontaneous cure, and that when apparently cured by treatment is more apt to recur.

The incidence of lacerated perineum, cystocele and rectocele, 38 per eent, leads to the same conclusion as with uterine displacement, which in most instances was also present. All these conditions probably have their effect by interfering with the normal circulation of the blood through the cervix.

The finding of 20.5 per cent of patients with adnexal disease, or 17.6 per cent with recognized salpingitis or salpingo-oophoritis, would make

it appear that endocervicitis bears a causal relation, especially so, since many cases of salpingitis and salpingo-oophoritis were observed to subside following cure of the cervix.

The absence of positive smears in all but 5 of 129 cases indicates that a small number of recent infections were seen, since the gonococcus is usually found only in the first two or three weeks of the disease. The incidence of 0.48 per cent proved by smear, or 2.3 per cent by smear plus history, can only be increased to 3.65 per cent by including as gonorrheal in origin all cases with urethritis and bartholinitis. The examination of some of the women with a history made it appear likely that the case was not of gonorrheal origin. Likewise all cases of urethritis should not be included, especially since concomitant skene duct infection was often absent.

The two bartholinian infections were probably, although not positively, due to the gonococcus. If all patients with salpingitis and salpingo-oophoritis, 183, are added to the figure representing the other complicating conditions suggestive of gonorrhea, the incidence would be increased to 21.2 per cent. Such an assumption is hardly warranted. The consensus of opinion appears to be that one-half of all cases of salpingitis is due to the gonococcus and the other half to puerperal or other infections. If one-half of 183 be added, the incidence would be 12.4 per cent. In the author's opinion, it does not exceed 5 per cent in the cases studied.

The incidence of urinary tract disease, 11.2 per cent, or of the infections, urethritis, cystitis and pyelitis, 5.6 per cent, occurring in the group, is lower than that attributed to gynecologic patients in general, which has been placed at 7.3 per cent.<sup>2</sup> Endocervicitis does not, therefore, appear to be a causative factor.

Treatment.—Whether a given cervix was treated with antiseptics and caustics such as iodine, silver nitrate and argyrol applied locally, or cauterized with the electric cautery, or referred to a hospital for operative treatment, was left to the judgment of the clinical assistant to whom the case was assigned. The number of patients treated with caustics and local antiseptics was 423; cautery treatment was used in 591 cases; while 25 patients were referred for operation. The local applications and cauterizations were done by ten or more different operators, many of them under the supervision of the clinic chief.

The treatment with caustics and antisepties consisted in either an application of 7 per cent iodine to the cervical canal and external os or an application of 2 to 20 per cent silver nitrate or merely the use of 10 to 30 per cent argyrol. In some instances the silver nitrate was applied immediately after the iodine application. For the most part only very mild cases received this method of treatment.

The cautery technic consisted in lightly burning off the red area and the mucous membrane lining the cervical canal. Deep cauterization was generally avoided. Nabothian cysts were burned out. Greatly hypertrophied cervices or clongated lips were punctured for a half inch or more with the cautery blade in some instances to produce depletion and retraction. Anesthesia was not used.

The patients were requested to douche every four hours with normal saline solution or bicarbonate of soda, 1 ounce to 4 quarts, and to return once a week for inspection and the application of antiseptics. The patients referred for operation chose their own hospitals and their own surgeons. If no selection was made, they were referred to the Woman's Hospital on the service of Dr. George Gray Ward.

An analysis of the three methods of treatment follows: Of the 423 treated with antisepties and causties 52, or 12.2 per cent, so treated were cured; 294, or 69.5 per cent, were improved; 77, or 18.1 per cent, were unimproved. The apparent cause of the failure to improve or become cured appeared to be insufficient treatment. Of the 591 cautery cases, 386, or 65.3 per cent, were cured; 125, or 21.1 per cent, were improved; 13, or 2.2 per cent, were unimproved; 67, or 11.3 per cent, failed to return after the cautery was used. The failure to return was found to be in most instances due to the fact that the treatment increased the leucorrhea, which created the idea that the disease had been greatly aggravated. More care to explain the after-effects of the treatment would have saved this loss of patients. Of the 25 patients operated upon 24, or 96 per cent, were cured; one, or 4 per cent, was improved but required cauterization of the cervical stump to cure the persisting inflammation. Whatever method of treatment was used the patients returned to the clinic weekly for an average of eight weeks.

Follow-up.—A questionnaire was sent to each of the 1,039 patients treated and a request to report for examination was made. One hundred and seventy-nine patients responded. Many of these were examined by the author. Sixty-three cases that had been treated with caustics and antisepties reported. Of these 26, or 41.27 per cent, appeared clinically cured; 21, or 33.33 per cent, were improved; 16, or 25.39 per cent, were unimproved. The clinically cured cases were not relieved of any of the symptoms usually attributed to the disease except leucorrhea; leucorrhea persisted to some extent in 6, or 23.07 per cent; backache in 8, or 30.77 per cent; menstrual disturbance in 4, or 15.38 per cent; urinary complaints in 2, or 7.69 per cent. Those who were improved still complained of leucorrhea in 17, or 80.95 per cent, of the patients so classed; of backache in 9, or 42.95 per cent; of menstrual disturbance in 6, or 28.57 per cent; of urinary complaints in 3, or 14.28 per cent. Those who were unimproved complained of leucorrhea in 11, or 68.75 per cent, of the cases so classed; of backache in 8, or 50 per cent; of menstrual disturbance in 6, or 37.5 per cent; of urinary symptoms in 2, or 12.5 per cent. With the 63 cases grouped together, 53.96 per cent of the patients still complained of discharge; 39.68 per cent of backache; 25.39 per cent of menstrual disturbance; 11.11 per cent of urinary symptoms.

One hundred and six patients who had been treated with the cautery reported. Of these 90, or 84.9 per cent, appeared clinically cured; 6, or 5.66 per cent, were improved; 10, or 9.43 per cent, were unimproved. Among the clinically cured patients 11, or 12.22 per cent, still complained of leucorrhea; 24, or 26.66 per cent, had backache; 19, or 21.11 per cent, had menstrual disturbance; 5, or 5.5 per cent, had urinary symptoms; 1, or 1.11 per cent, had stenosis of the cervix re-

quiring dilatation; 30, or 33.33 per cent, had no complaint.

Those who were improved complained of both leucorrhea and backache in 6, or 100 per cent, of the cases so classed, and of menstrual disturbance in 3, or 50 per cent. None complained of urinary discomfort. Those who were unimproved complained of leucorrhea in 8, or 80 per cent, of the cases so classed; of backache in 3, or 30 per cent; of menstrual disturbance in 3, or 30 per cent; of urinary symptoms in 1, or 10 per cent. With the 106 cases grouped together, 25, or 23.59 per cent, still complained of discharge; 33, or 31.13 per cent, of backache; 25, or 23.59 per cent, of menstrual disturbance; 6, or 5.66 per cent, of urinary symptoms; 1, or .94 per cent, had stenosis.

Ten patients who had had various operations performed upon the cervix reported. These were described as tracheloplasty (1), trachelor-rhaphy (1), curettement (3), amputation (3) and suspension of the uterus (2). Of these 7, or 70 per cent, appeared clinically cured; 3, or 30 per cent, were unimproved. Among the clinically cured patients there was one only, 14.28 per cent, of those so classed with symptoms persisting. This patient's chief complaint had been sterility. Suspension of the uterus and curettement had been done. The retroversion had recurred. She had become pregnant twice but had aborted each time.

Those who were unimproved reported as follows: one had amputation of the cervix performed in May, 1925, and still complained of leucorrhea and dysmenorrhea. Cervicitis was still present. The second had amputation of the cervix two years previously and still complained of leucorrhea and backache. The cervical stump was badly eroded. She had become pregnant following her operation and had miscarried. The third had curettage and cautery treatment in November, 1925. She still had leucorrhea, backache and dysmenorrhea. Inspection of the cervix showed erosion and hypertrophy present. Among the three unimproved patients leucorrhea persisted in all, or 100 per cent, of cases so classed; backache in 2, or 66.66 per cent; menstrual disturbance in 2, or 66.66 per cent.

Grouped together, 30 per cent of the ten operative cases still complained of discharge; 20 per cent of backache, and 20 per cent of dysmenorrhea.

Pregnancy Following Treatment.—Pregnancy occurred after treatment in 25 cases, 8 of which are recorded on clinic charts and 17 in the follow-up investigation. Of the 423 patients treated with caustics and antiseptics, 12, or 2.8 per cent, are known to have become pregnant. Seven, or 58.33 per cent, of these women were previously sterile. Two of the 12 miscarried. After cautery treatment, 10, or 1.6 per cent, of the 591 patients treated are known to have become pregnant. Of these, 2, or 20 per cent, were previously sterile. Three miscarried. Of the 25 patients operated upon, 3 are known to have become pregnant. All three, or 100 per cent, were previously sterile. Two of them aborted, one of them twice. Both had had amputation of the cervix. Of the 63 cases treated with antisepties, who reported in the follow-up, 9, or 14.2 per cent, became pregnant; of the 106 cautery cases in the follow-up 5, or 4.7 per cent, became pregnant. Of the 10 operative cases, 3, or 30 per cent, became pregnant.

Abortion After Treatment.—Of the 25 patients who became pregnant after treatment, 8 have not yet reached term and 7 have aborted. Only 10 have been delivered. Two of the 12 patients who became pregnant after treatment with antiseptics aborted, 16.66 per cent; 3 of the 10 who became pregnant after cautery treatment aborted, 30 per cent; two of the three patients who were operated upon miscarried, 66.66 per cent.

Labor Following Treatment.—Following treatment with antiseptics 5 patients gave birth to children, 4 labors were easy and one was a forceps delivery, 20 per cent of difficult labors. After cautery treatment 4 patients gave birth to children, 2 were easy and 2 difficult, one a forceps after four hours in labor and the second a cesarean, performed on account of the pelvic measurements, a questionable 50 per cent of difficult labors. Subsequent to operative treatment one patient had a normal birth, 100 per cent of normal deliveries.

### GENERAL DEDUCTIONS

Endocervicitis as a Cause of Sterility.—Of the 959 married women 191, or 19.9 per cent, had never been pregnant although but 61, or 6.3 per cent, complained of sterility. Several women were observed to became pregnant in the presence of cervicitis. In 20 of the sterile women, or 1.9 per cent of cases, no other recognized cause of sterility was observed. The others were found to have uterine displacements, adnexal disease, polypi, fibroids or vaginitis.

The analysis of 500 sterile marriages by Dr. Macomber<sup>3</sup> attributed

5 per cent to endocervicitis, a figure which appears conservative when compared with the 20 cases in 191 sterile marriages, or 10.4 per cent, shown in this study.

Of the 61 patients complaining of sterility, 13, or 21.3 per cent, were recorded as having no other evident reason for the sterility. The husbands of these patients were routinely referred to the Genito-Urinary Department and are presumably excluded from responsibility. The conclusion is reached that most women with endocervicitis may become pregnant if they so desire, since 80.1 per cent of the married women in this study had at some time borne children or aborted, but it must also be concluded that inflammatory disease of the cervix may prevent conception, since it appears responsible for 10.4 per cent of the sterile marriages and responsible for 21.3 per cent of sterility among patients desiring children.

Endocervicitis as a Cause of Abortion.—Of the 392 women who had aborted once to fifteen times, approximately one-half aborted spontaneously and one-half, 191, admitted induction. Only one patient with endocervicitis aborted while under observation and she had been cauterized lightly in an attempt to cure a cervicitis. Of the 1,039 women examined, two gave abortion as a reason for visiting the clinic. Neither had the Wassermann test. Both left the clinic before investigation was completed. No evidence that the disease produces abortion has been found.

Endocervicitis as a Cause of Menstrual Disturbance through Endocrine Dysfunction.—Menstrual disturbance was the chief complaint in 16.9 per cent of cases and was mentioned by 45 per cent of patients. The 45 per cent is made up of 296 cases, or 28.4 per cent, with varying degrees of dysmenorrhea, 100 cases, or 9.6 per cent, with menorrhagia, 72 cases, or 6.9 per cent, with metrorrhagia. These percentages are well below those usually given for the incidence of the same conditions in gynecologic patients (Dr. Mary P. Jacobi 46 per cent, Dr. Holden 47 per cent for dysmenorrhea alone). Dr. Van Duyne<sup>4</sup> in a study among college girls found 37.4 per cent of dysmenorrheas in one group, 26 per cent in a second and 13.4 per cent in a third, an average of 25.6 per cent. Sturgis observed that 35 per cent of 2,077 women employed in a department store had menstrual incapacity. The follow-up in this study showed that where dysmenorrhea existed, it was not relieved in any instance by cure of the cervix.

Many of the menorrhagias were clearly not of endocrine origin, but in the cases presumably due to ovarian hyperfunction cure of the cervical disease apparently did not lessen the flow. Likewise the metrorrhagias of the menopause presumably due to endocrine dysfunction were unaffected by clinical cure of the cervicitis. Apparently the disease does not have an effect on ovarian function sufficient to disturb menstruation.

Endocervicitis as a Cause of Urinary Symptoms.—While 28.7 per cent of patients had urinary symptoms, only 11.2 per cent were found to have lesions of the urinary tract, inclusive of relaxed vesical sphineter, 4.7 per cent, and infections, 5.6 per cent. It appears, therefore, that 17.5 per cent of patients had urinary symptoms due to causes outside the urinary tract. Complicating conditions were found to be responsible for these symptoms except in 45 patients, or 4.3 per cent of cases. In the follow-up, the patients with urinary symptoms persisting had definite lesions to account for them. Furthermore, the incidence fell to 5.6 per cent in the cured cases. This may mean that endocervicitis can in some instances produce urinary symptoms, but, as stated in discussing complications, clinically it does not appear causative of urinary tract infections.

Endocervicitis as a Cause of Leucorrhea.—Leucorrhea has been said to be due to disease of the cervix in 95 per cent of instances. In this study 74.1 per cent of patients gave it as a complaint. In all the 1,039 patients examined, its presence was noted by the examining physician, although some of the women with the most profuse discharge appeared oblivious to it. Its apparent cessation, as well as the absence of inflammation, was the standard by which clinical cure was judged. The number of patients clinically cured by all methods of treatment was 462. In the follow-up 123 of the 179 cases reporting, or 68.7 per cent, were cured of all evidence of cervical disease, although 17, or 13.8 per cent, of the cured cases still complained of discharge. The cessation of leucorrhea in 86.2 per cent of the cured cases establishes the symptom as due to endocervicitis in at least that percentage of instances.

Endocervicitis as a Cause of Backache.—Backache has usually been considered a symptom of endocervicitis. In this study 381 women, or 36.5 per cent, complained of backache. A study of the complications existing showed that backache did not exist unless the disease was complicated by some other recognized cause of that symptom, except in 4 cases. The clinically cured patients reporting in the follow-up all had backache when backache was an original complaint. Of those cured by antiseptics backache persisted in 30.77 per cent; of those cured by cautery, in 26.66 per cent; of those cured by operation, in 30 per cent. If unexplained backaches were all attributed to this disease the incidence would be 0.38 per cent. Backache, therefore, is not a symptom of inflammation of the cervix.

Endocervicitis as a Cause of Abdominal Pain.—Abdominal pain was complained of by 316 women, or 30.4 per cent, all of whom, except 20, were found to have a definite cause other than cervicitis, such as,

0

d

38

10

1

6

it

r

S

9

n

S

salpingitis, adnexal disease, uterine displacement, fibroids, cervical polyp and urinary tract disease. The 20 patients in whom no cause of pain was recorded were apparently not sufficiently observed. The follow-up failed to show that uncomplicated endocervicitis is ever a cause of abdominal pain.

Endocervicitis as a Cause of Cancer of the Cervix.—The precancerous nature of endocervicitis has recently been emphasized by pathologists. In this series of 1,039 cases, cancer occurred only once, an incidence of 0.09 per cent.

Mrs. A. was admitted to the clinic on July 21, 1922. Aged thirty-seven years. Married 10 years. No children. Three miscarriages, last 6 years before. No trouble. Menstruation 17 x 28 x 3, last time July 16, 1922. No operations. No sicknesses. Complaints: pain on right side and in vagina; dyspareunia on and off for about 2 years, worse in last month. Slight discharge. Bowels regular. Gets up once at night to micturate, slight burning at times. The uterus was movable, anteflexed, normal size. The diagnosis was cervicitis.

The history was taken and the first examination made by an experienced gynecologist and pathologist. She was treated by him and other members of the staff with antiseptics and caustics continuously for 22 months until May 1, 1924, when the cautery was used. Considerable bleeding followed and healing did not take place, so that two and a half months later the cervix was recauterized. No improvement followed and the patient was referred to the hospital December 30, 1924. The examination showed erosion of posterior cervical lip, destruction of cervical tissue up to vaginal junction, moderate erosion anteriorly and laterally about external os with extension of carcinomatous tissue up into cervical canal, involving by infiltration the entire cervix and beginning parametrial involvement. Dilatation and curettage were done, followed by the insertion of 100 mg. of radium for 24 hours.

The pathologic diagnosis was squamous cell carcinoma with a small amount of normal endometrium.

The complaint of pain in the vagina and increasing dyspareunia for 2 years, as well as the failure of the supposed cervicitis to improve under continuous treatment for 22 months and the advanced involvement found at operation, is evidence that the disease was carcinoma from the beginning and that no change from cervicitis to malignancy occurred. A 4-plus Wassermann was early obtained and antisyphilitic treatment given. The syphilis was thought to explain the failure to heal and delayed the recognition of the true condition. No positive evidence of the so-called precancerous nature of endocervicitis can be observed clinically.

### SUMMARY AND CONCLUSIONS

Cervicitis was present in 33.16 per cent, or about one-third, of gynecologic patients, an incidence lower than that usually attributed to the disease but higher than should be found among women in general.

The age incidence of 33.5 years confirms the conclusion that the disease is usually found during the childbearing period.

The traumatism of labor or abortion appears to be the chief etiologic factor, since 80.1 per cent of the patients had borne children or had aborted. The married state in itself appears to be a factor; of the 92.3 per cent of patients who were married there were 12.2 per cent who had never been pregnant, as compared to 7.7 per cent of single women.

Uncomplicated endocervicitis has no cardinal symptom except leucorrhea, of which 74.1 per cent of the women complained. The cessation of discharge in 86.2 per cent of cured cases establishes the symptom as due to endocervicitis in that percentage of instances.

The incidence of abdominal pain, 30.4 per cent, as the chief complaint exceeded that of leucorrhea, 21 per cent, but was explained by complicating conditions, most often salpingitis, and is not a symptom of cervical disease.

Uterine displacement, occurring in 44.2 per cent of cases, or perineal lacerations with cystocele and rectocele, occurring in 38 per cent of cases, or the combined conditions are complications which favor the development, continuance and recurrence of the disease.

A primary endocervicitis is in many instances causative of salpingitis and salpingo-oophoritis, although the reverse may be true, as shown by failures to cure. The gonococcus is seldom the organism infecting the cervix, judged from the proved incidence in this series of 0.48 per cent, the possible incidence of 3.65 per cent.

A small number, 12.2 per cent, of cases of inflammation of the cervix may be cured by the application of antiseptics and caustics. These were apparently the least diseased cervices, consequently it must be judged that treatment of this kind is apt to be palliative, not curative, and seldom indicated.

The use of the cautery should be accepted as the standardized method of treatment, since 65.3 per cent of patients so treated were cured and no dystocia in subsequent labors resulted.

The cervix should seldom be operated upon in the presence of inflammatory disease. The percentage of cures is high, 96 per cent; 70 per cent in the follow-up. The tendency to become pregnant is increased; 30 per cent in the follow-up. The liability to abort is increased, 66.66 per cent, especially by amputation. Dystocia from tracheloplastics is reported in the literature, but none in this study have gone through labor.

Endocervicitis is a frequent cause of sterility, accounting for 10.4 per cent of sterile marriages in this study or 21.3 per cent of sterility among the patients desiring children. It is not a cause of abortion, but abortion may cause it.

It does not cause endoerine, especially ovarian, dysfunction, since it apparently does not produce menstrual disturbance.

It is not a cause of backache, abdominal pain, or urinary tract disease.

Clinically no evidence was found that endocervicitis is a precancerous lesion.

#### REFERENCES

<sup>1</sup>Taylor, H. C., and Peighthal, J. C.: AM. JOUR. OBST. AND GYNEC., 1924, viii, 288. <sup>2</sup>Fulkerson: Gynecologic Urology, Philadelphia, 1925, P. Blakiston's Son and Co.,

Macomber, D.: Etiology of Sterility in the Female from an Analysis of 500 Case Reports, Boston Med. and Surg. Jour., 1922, clxxxvii, 397.

Wan Duyne, S. E.: Some Observations on Dysmenorrhea at Goucher College, Am. JOUR. OBST. AND GYNEC., 1925, ix, 234.

Eastman, N. J.: Spontaneous Rupture of Uterus in Labor Following Sturmdorf Tracheloplasty, Am. Jour. Obst. and Gynec., 1926, xi, 500.

903 PARK AVENUE.

(For discussion, see page 422.)

# SEMEN INJECTIONS WITH SEROLOGIC STUDIES A PRELIMINARY REPORT

BY SAMUEL S. ROSENFELD, M.D., NEW YORK CITY

(Adjunct Gynecologist and Obstetrician at Lebanon Hospital)

SEVERAL clinicians and immunologists have expressed the possibility of creating an active immunization to spermatozoa by injecting them in a manner analogous to the injection of vaccines. The experiments noted below were performed to determine, first, whether a spermatoxic principle could be produced in the sera of women injected with seminal fluid containing spermatozoa, and secondly, to find out whether a biologic body capable of binding complement is elaborated.

Guyer demonstrated a spermatoxic action in the sera of fowls injected with rabbit sperm. He also demonstrated a spermatoxin in the sera of injected female rabbits; this spermatoxin, however, was not as potent as the spermatoxic substance he was able to produce in the sera of male rabbits. His method, and indeed the method of most observers employed to demonstrate the presence of spermatoxin, consists in mixing the serum of the "immunized" animal with the sperms of the animal from which the material for injection was obtained. Drops of this mixture are studied under the microscope at regular intervals, paying particular attention to the morphology, the degree of motility and the length of life of the spermatozoa in the serum. A control of either undiluted semen or semen diluted in normal saline or weak bicarbonate solution is examined at the same time. Death of the spermatozoa or a very marked diminution in their motility within a few minutes after their contact with the serum is considered a positive reaction.

My experience in human beings consists of the following three hospital patients:

Case 1.—Mrs. J. B., aged fifty-one, was suffering from encephalitis lethargica. At the time this patient was studied, foreign protein was being extensively used in the treatment of encephalitis, and her attending physician kindly permitted me to

make the semen injections. I employed human semen containing very large numbers of well-formed actively motile spermatozoa. The semen was sterilized in a waterbath at 60° C. for one hour. The first injection consisted of 0.5 c.c. of semen and was injected into the subcutaneous tissues of the arm. Four additional injections of 1 c.c. each were injected subcutaneously at three day intervals. There was neither a local nor general reaction following these injections. There was no evidence of any spermatoxic action in the serum.

Case 2.—Mrs. I. E., aged thirty-five years, was suffering from rheumatic valvular cardiac disease. She was injected as was the first patient except that for one injection fresh semen with living spermatozoa was used in an effort to provoke a spermatoxic reaction. Following this injection there was a moderate local reaction in the arm and a slight rise in temperature. No spermatoxic action was demonstrable in the serum.

Case 3 .- Mrs. A. K., age twenty-nine years. This patient was suffering from multiple arthritis. The Wassermann reaction as well as the complement-fixation test for gonorrhea was negative. This woman received eleven injections of semen. After four injections, one of fresh semen containing living spermatozoa and the other three consisting of semen preserved with a little neutral aeriflavine solution, her serum was examined. The motility of the spermatozoa in the serum after four hours was good, after eight hours it was greatly diminished, after twenty-four hours only two spermatozoa were seen feebly moving, and after twenty-eight hours no living spermatozoa could be found. The patient imagined that her joint pains were relieved by these injections and requested that she be given more. I injected her with 1.5 c.c. of semen containing living spermatozoa in an effort to obtain a real positive reaction, i. e., complete or almost complete absence of motility in from five minutes to a half hour. Three days later I injected her with an equal quantity of semen preserved with acriflavine solution. The day after this injection I again examined the serum and found that after twenty-six hours all the spermatozoa in the control had died while the spermatozoa in the serum were very active. I then injected her with an ether extract of semen and she developed a marked local reaction, incidentally the only reaction she ever developed. On account of this reaction I did not repeat the ether extract injections. I then injected her with 1 c.c. of fresh semen and the day after with the same quantity of the same semen preserved with aeriflavine solution. Three days later she was again injected with live spermatozoa and on the following two days with semen plus acriflavine solution. Ten days after this last injection a complement-fixation test was carried out, using human semen as an antigen. The antigen was titrated in the usual manner. The reaction was negative. Ten days after this complement-fixation test, I again examined the serum as described above and found no spermatoxic reaction. I purposely waited before examining the serum in the hope that a spermatoxic substance would be formed in the interim. The patient then left the hospital and it was impossible to continue the injections.

In the following experiments two female rabbits were employed with one male rabbit used as a control. Over a period of two months the two female rabbits were injected subcutaneously every third day with 1 e.e. of human semen, except for the last injection, which was given intraperitoneally. The serum test for spermatoxin was uniformly negative. Forty days after the last injection a complement-fixation test was performed using as antigen semen diluted in normal saline. This antigen was titrated in the usual manner. The test was strongly positive in the sera of both female rabbits in dilution of 1:200 and 1:400 and weakly positive in a dilution of 1:600. The serum of the uninjected male rabbit was negative as was also a control human serum. This test was repeated eleven days later and the results obtained

bers

ter-

and

of

her

any

ılar

jec-

ma-

the

om

test

ter

her

her

nlv

ing

re-

ith

tes

len

red

rol her nt-

re-

ine

the

ast

iti-

vo.

de-

mthe

the

ale

ere

he

on

en

th

of

111-

ed

were similar to those of the first test. The test was repeated for the third time eight days after the second test and the results were weakly positive, i. e., 1 plus. It was determined before proceeding with the complement-fixation test that the "immunized" rabbit alone did not bind complement, that human serum alone did not bind complement, that semen alone did not bind complement, and that rabbit serum mixed with an equal quantity of human serum did not bind complement.

#### SUMMARY

Three women received repeated injections of human semen containing spermatozoa. Only two reactions, both local and neither serious, were encountered. The semen injected was prepared in several ways: (a) obtained under aseptic precautions and injected in the fresh state; (b) in a water-bath at 60° C. for one hour; (c) preserved with a weak solution of acriflavine. Acriflavine was used because its antiseptic action, it is claimed, does not produce a coagulation of proteins.

A definite positive test for a spermatoxic body was not demonstrable.

In the serum of the female patient subjected to a complement-fixation test the result was negative.

In the sera of the two injected female rabbits a spermatoxic principle was not demonstrable. There was, however, clearly demonstrated a complement-binding body. The quantity of this substance was rather rapidly diminished.

#### COMMENT

Careful observers have demonstrated that fertility in the male animal can easily be diminished or destroyed by injection of spermatozoa. These injections cause atrophy and sometimes necrosis of the testes. It is much more difficult to produce corresponding phenomena in female animals. In human females I was unable to demonstrate any antibodies after injections of both live and dead spermatozoa. Isolated, vague reports from birth control clinics seem to show that women who have been injected with semen can avert pregnancy for about twenty months. This temporary sterility is probably due to the production of a spermatoxic antibody. This antibody apparently disappears or is greatly diminished in quantity at the end of twenty months. (Should the opportunity present itself I hope to study this problem.) It may be possible to regulate the injections so that a sufficient quantity of spermatoxic substance would always be present in the serum. Such a procedure would indeed lighten the load of the women in whom pregnancy is contraindicated. Judging from the women studied in our series, it would require many semen injections to initiate the production of spermatoxin.

#### REFERENCES

Guyer: Jour. Exper. Zool., February, 1922, v, No. 2, 35.

Morse: Science, May 10, 1912, xxv, 754. Sampson: Biol. Bull., October, 1922, v, No. 4, 43.

1272 GRAND CONCOURSE.

### NOTE ON A METHOD FOR ANTEVERTING RETROVERTED UTERI

BY L. DROSIN, M.D., NEW YORK CITY

X71TH the usual bimanual method of replacement we frequently experience great difficulty and even failure in bringing a retroflexed or retroverted uterus forward if the malposition happens to be marked, or if mobility is limited. As a result of my endeavors to

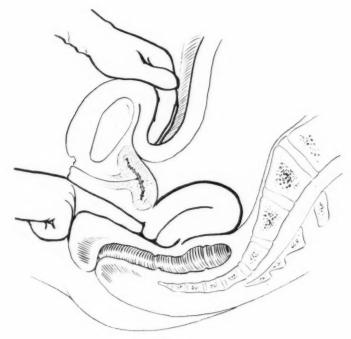


Fig. 1.

overcome this difficulty I have developed a technic which will, in the majority of cases, in the absence of adhesions, temporarily overcome this condition so as to facilitate the introduction of a pessary, packing or tampon; and in those cases which are apt to yield to nonsurgical treatment as an auxiliary therapeutic measure.

Prerequisites: (a) absence of acute inflammatory conditions; (b) dorsal position with knees flexed; (c) relaxed condition of abdomen. With firm pressure of one or two fingers on the anterior surface of the cervix, in a direction backward and upward and with all the fingers of the other hand starting from a point just above the symphysis, pressure is exerted in a direction backward as far as possible and somewhat downward (Fig. 1). With both hands in the position described, the external hand is suddenly released (Fig. 2). This causes the body of the uterus to spring forward and the cervix backward. The internal fingers are now, as well as later, accommodated to the changed position of the cervix, so as to maintain a vantage position for pressure, and the depression and release of the external hand is repeated until the uterus is progressively brought in an anterior position (Fig. 2), or until it is sufficiently forward to facilitate the completion of the anteversion in the usual bimanual way.

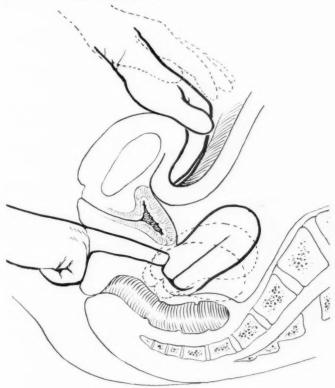


Fig. 2.

The anteversion of the uterus is favorably influenced when the technic is preceded by a few bilateral or combined bilateral and anteroposterior movements of the cervix at a high level, or of the body of the uterus, if possible.

In cases of dextroversion or sinistroversion (and even when the uterus is in a median position), it is frequently advantageous to place the external hand to the right or left of the median line on the same level with the symphysis, or to alternate the positions, with the object not only of initiating the dislodgment of the uterus but of accomplishing its anteversion as well.

When employing this technic as an auxiliary therapeutic measure I bring the uterus to an exaggerated anteversion and maintain it in that position, bimanually, for two or three minutes before instituting treatment.

1851 SEVENTH AVENUE.

tly robe to

# A STUDY OF THE CONTOUR ABDOMINAL MEASUREMENT OF PREGNANCY

BY GEO. F. PENDLETON, A.B., M.D., F.A.C.S., KANSAS CITY, MISSOURI

THE purpose of this paper is to study the contour abdominal measurements of pregnant women in regard to estimating the probable date of labor. I will recapitulate the ideas of the past and eliminate some of their undesirable factors, paying particular attention to the various positions and some abnormalities of pregnancy. To determine the value and possibilities and attempt to decide what method would be best to follow is the ultimate aim.

Ahlfeld, of Leipzig, was the original nineteenth century investigator and first used the tape and pelvimeter. Baume, his associate, studied a frozen longitudinal section of a dead pregnant woman and reported interesting details of fetal length in utere and thickness of maternal abdominal walls in regard to this measurement. Suttigen, of St. Petersburg, confirmed Ahlfeld's observations and conclusions. Through following years Reid, Tramer, Walraf, Tessier, Shatz, Issmer, Spiegelberg, Winckel, Hecker and Buhl, Schroeder, Krönig and Zweifel, Kleinwächter, Pfaunkuch, Karb, Morris, Voorhees, Stone, Ostreil, Blau and Christofoletti, and Reed reported various details concerning the duration of pregnancy and influences causing variations in the length and weight of babies, and the value of the introduction of premature labor. Pawlik, Müller, Schatz, Perret, Munroe-Kerr, Pinard and Stone observed especially details of the fetal head in regard to the maternal pelvis. Most men of the past were particularly desirous of more data concerning a definite relationship between fetal biparietal diameter and the maternal pelvis. McDonald (1906) first placed special emphasis upon the value of tape measurements in forecasting the probable date of labor which Ahlfeld and Suttigen formerly condemned. Reed (1920) popularized this method by advocating the introduction of labor to prevent postmature babies, using the measurements as a guide. Spaulding (1913) presented the first and only real statistical study of value from which he evolved a working rule more complicated than that of McDonald.

McDonald measures with a tape "from the upper edge of the symphysis over the abdominal contour to the highest point of the fundus save at the last dip where the tape continues to the ensiform (multipara with relaxed abdominal walls should be supported on the sides to make the occipital coccygeal axis of the fetus in the long axis of the body)." Spaulding measures "from the upper edge of the symphysis over the abdomen with the distal tape finally resting on the ensiform eartilage, being watchful that the uterus is at rest, of careful measuring, skill in estimating the degree of settling and thickness of abdominal walls and elimination of multiparity and hydramnios conditions." In both methods the height of the fundus above the symphysis is recorded from the tape.

From the past investigations let us record certain fundamental facts. Until 1905 all investigations condemned the method as very unreliable and inaccurate. The fetus has a natural position in utero, i.e., bending its head and crossing the arms over its breast with the bended knees brought forward up toward the abdomen and the spine

### ORP Late Less Than 2 Wks

OF

OURI

leas-

able

nate the

nine ould

used

etion itero igen,

fol-

ckel.

arh,

rious

the

ibor.

past

veen

able

oputure first

nore

the the

be

ong

vsis

ing de-

rity

the

tal ery ro, he ne

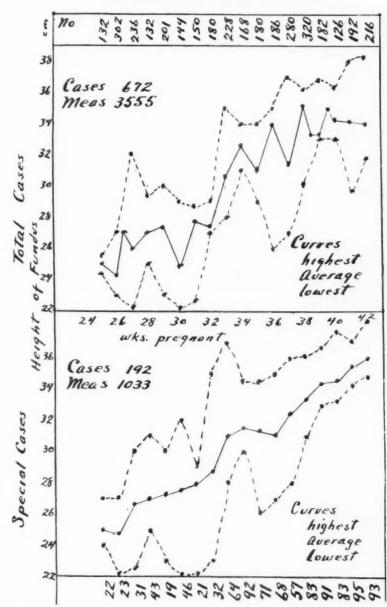


Chart I.—O.R.P. Late. Highest and lowest curves fluctuate less widely in late pregnancy but still are very far apart and their mean difference is the same in both classes. Average curve improves in special cases where it remains closer to the low curve. Therefore, in Chart I, measurements in early pregnancy are very unreliable with possibility of great error until the thirty-eighth week, regardless of the careful expurgations as in special cases. My observations have been that this position is very unreliable the reason for which I have attributed to flexion of fetal head and spine. Certainly no great operative procedure is justified because of an enlarged O.R.P., late McDonald.

flexed so that it represents an egg-shaped outline. Its position determines the shape of the uterus rather than the uterus causing fetal position. The length of the fetus is the surest indication of its age in gestation and equals twice the interuterine axis. Growth of the uterus increases gradually between the twenty-fourth and fortieth week of pregnancy. This fact is denied vigorously by Spaulding who declares that the rate of growth decreases as the weeks of pregnancy increase. Height of the fundus depends on the fetal occipital coccygeal diameter and at term approximates 35 cm. This height varies with the contraction of uterine muscle and oblique measurements. When at rest on the back the uterus rarely descends in ten lunar months of pregnancy. The convexity of the fundus is not constant. Abdominal measurements vary with certain influences, such as thick abdominal walls, full bladders, contracted pelves, lightening, hydramnios and multiple pregnancy. McDonald formulated the rule: "Divide height of fundus in centimeters by 3½ to obtain the lunar month of pregnancy" which he claims is very accurate after six months gestation and more accurate under 35 cm. than above it, but Spaulding maintains it is close to Nagel's rule only during the last four to six weeks. Spaulding presented a more complicated rule as follows: To obtain the week of pregnancy

When 22 to 26 cm., add 2 to height of fundus in centimeters When 26 to 30 cm., add 3 to height of fundus in centimeters When 30 to 32 cm., add 4 to height of fundus in centimeters When from 32 cm. on, add 5 to height of fundus in centimeters

He concludes that "abdominal measurements are of value in estimating the degree of maturity of the unborn child and the probable week of pregnancy can be determined by careful measurements, being especially good for those who go overtime." The impetus for this present investigation lies in the fact that few men have publicly declared the value of this measurement and only one of these offers statistical observations; yet these few men differ upon one important fact, i.e., the rate of growth of the uterus during the latter part of pregnancy, a fact which is vital in estimating the probable date of labor.

The value of this measurement centers upon its dependability. If reasonably accurate it would be another check to aid in forecasting the probable date of labor since conception occurs in the pre- and postmenstrual cycle and Nagel's rule (counting back three months and adding seven days) naturally varies accordingly. The following statistics have proved that Nagel's rule in 5198 cases was correct within two weeks in 87 per cent, in one week 81 per cent, and absolutely correct in 19 per cent. The height of the navel above the symphysis varied from 12 to 20 cm. in 2000 cases and from 12 to 23

em. in my 1200 cases. The ensiform notch varies in proportion from the symphysis and depends too upon the flexion of the maternal vertebral column. Quickening varies somewhat with the degree of

## O.LP LateLess Than 2 Wks

0

k

:

r

it

is

t-

k

S-

is ly

rs

of of

If

ig st-

nd ng

et id he 23

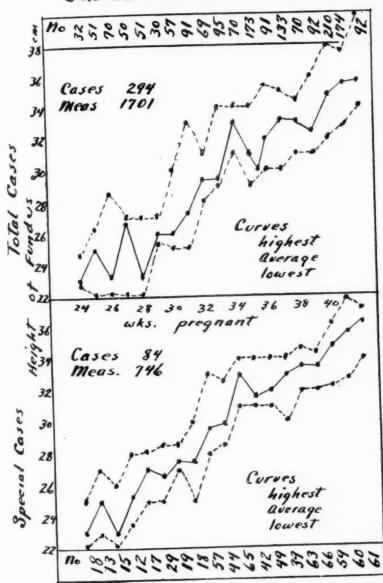


Chart II.—In O.L.P. Late. The special high and low curves have less fluctuation and remain closer to the average line, and their difference improves as pregnancy advances. The average curve fluctuates out of unison with high and low curves, meaning irregularities in measurements are common even in special cases. Before the thirty-sixth week under measurements predominate, after which over ones are more numerous. This chart might be classified as reasonably accurate.

sensitiveness of the individual nervous organism. At present in fact we have no real accurate method of determining the probable date of labor. Such a method would be a balm to the nervous and especially the greatly concerned, unexperienced, first-time pregnant woman and satisfy the frequent queries, "Am I too large?" "Am I all right?" We could truthfully advise the stranger whether she dared travel to her own home. Forgotten dates of last menstruation and quickening would not leave us so stranded as we are today and the confidence of our patients as well as better psychologic control would result. We could foretell and prevent oversized babies as well as those not infrequent postmature pregnancies with their accompanying hard labors and often permanent maternal morbidity and possibly fetal mortality. Borderline cesarean and version cases could often be treated by bag induction since the biparietal diameter of the fetus could be indirectly calculated from the estimated fetal length and checked against the Perret measurement. Legally the age of the fetus in utero might become of value. Abnormalities could be suspected and the obstetrician forewarned against misplaced positions, multiparity, extended head, or ovarian, uterine, and pelvic tumors. Lastly, for those who recognize the religious power of Rome and require rigid assurance of fetal viability, such a measurement if dependable would be of great value in the protection of baby mortality in early gestation where mothers are perhaps in the extremes of toxemia, nephritis, cardiac decompensation, typhoid, diabetes or chorea, etc.

In reviewing former observations certain weak spots become evident. The biologic factor of error has been increased through the use of measurements by a variety of different men in different clinics. McDonald lacks well recorded statistics. Spaulding lacks individual observations thereby increasing his factor of error. No study of the various common fetal positions has been presented nor has a method of estimating the result of fetal engagement been devised. Very few abnormalities have been emphasized and little attention paid to uterine contractions and their influence. In general, presented observations are comparatively small in number, Spaulding using 100 to 400, Ahlfeld 250, Suttigen 409, while McDonald lacks statistics. The present rules vary with the different weeks in pregnancy and are not very accurate. The lack of one large mass of material measured and observed by one individual, the small attention to various common normal positions and meager statistics are the outstanding defects in the present literature.

With the foregoing details in mind the following presentation has been studied with special stress upon the defects to date. From 1917 to 1924 I have collected a large mass of material in and around the regions of Kansas City which is presented in Table I, and totals 5500 cases with 22,500 measurements. One thousand three hundred two

### O.L.A. Late Less Than 2Wks

act

of lly

ind

to

ing

of

We

in-

ors

ty.

ag tly

he

ght ried

ho

of

eat

ere

ae

vi-

Ise

es.

he od

to

er-

he

ot

nd

m

ts

as 17 he 00 vo

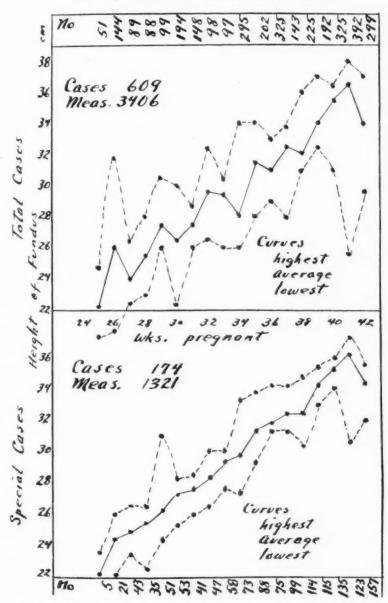


Chart III.—O.L.A. Late. Special cases show even high and low curves, closer together, steady throughout twenty-fourth to fortieth week, fluctuating in common with the average which is close to the center line. This chart is more reliable, less liable to erratic results and increases in value in special cases. The drop in the forty-first week not due to lightening probably results from increased Braxton Hicks contractions during that week which I have noticed often seem unusually strong.

cases totalling 2,832 measurements have been expurgated as representing gross mistakes through abnormalities or cases not paralleling Nagel's rule close enough for study. The remaining 4,198 cases with their 19,666 measurements all came within two weeks of the expected time according to Nagel's rule. Not included in this material are 1,209 cases with 7,268 measurements comprising private work and cases kindly loaned to me for study. These measurements were all made and their menstrual dates personally verified by me. It is my intention to compare these two classes of material thereby checking the work of the past on a larger scale than heretofore, as well as presenting a number of personally observed cases with a constant biologic factor of error in measuring reduced to one. Hereafter the two classes of material will be designated as "total cases" and "special cases." All material has been classified into the routine vertex positions, breech, twins, and cesarean. Where the material was sufficient. cases coming within two weeks of Nagel's rule were classified as early or late signifying whether they occurred before or after the standard predicted time of labor. In all cases certain factors of error have been eliminated where possible, the special cases being much more refined than the general material. Measurements vary with the individual performing them and his knowledge of the exact rules laid down by McDonald and Spaulding whose methods result practically the same. Too many read the tape first and fit it to the contour of the abdomen. One or 2 cm. error in reading have not been uncommon in my experience with other men. Measurements becoming smaller after a cathartie have been refused. Pendulous abdomen or much abdominal fat have so seriously upset calculations as to be laughable. ments smaller than those in the preceding two weeks have been eliminated as well as each following it.

Tumors of the ovary or uterus, much tympanites, hematoma of the broad ligament, full bladder, full rectum and ascites have in my experience completely upset scientific control. No contracted pelvis is included. All uterine suspensions which have been observed to produce shorter babies were not considered. No contracted uterus which occasionally varied 2 to 5 cm. or a uterus at rest during labor which has varied 2 to 8 cm. was retained. Hydramnios which McDonald insists caused no trouble, in my hands has changed science to the ridiculous. Poor presentations gave wretched measurements. Floating heads were pushed to the pubes or refused. Lightening which was very unusual was always carefully eliminated, often checked by rectal examination and attempts at skill in estimating this degree of settling were referred to a chart of its own. Where possible, extension of fetal head or fetal spine was eliminated but no doubt severe errors of this nature may be included due to the impossibility of the

### O.R.A. Late Less Than 2 Wks.

nt-

ng ith

ed are nd all

my

ng

re-

10-

WO ial

si-

nt, or re-

en

red

ual

by

ne. en. eriar-

fat re-

mi-

the ex-

is

ro-

ich

oor

ich ice

its. ing

red ree exere the

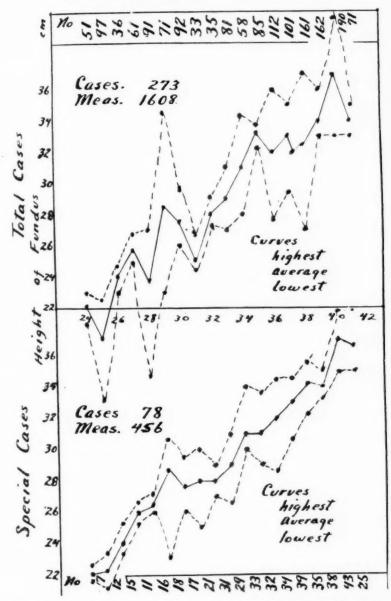


Chart IV.—O.R.A. Late. Presents special curves with less fluctuation and nearer the average in the center line throughout, which signifies a reliable curve with less chance of error, yet no better than O.L.A. or O.L.P., late curves.

Of the positions coming late O.L.A. and O.L.P. are most reliable.

OR.P. is almost hopeless. Curves in special material clearly show the value of careful elimination.

necessary diagnosis. It is my postulation that many of the posterior vertex position present such conditions and the uterus depending on the outline of the fetus compensates accordingly. An occiput impinging on posterior obstruction causing partial extension of the head might account for the large variability found in posterior vertex estimations. Weak abdominal walls were always supported to present the fetus in the uterine axis and the center line of the mother. Lastly all cases were required to start into labor without any method of induction and came within two weeks of Nagel's prescribed rule.

Notice, in Table I, the close similarity between the number of early and late cases for each vertex position with the exception of O. L. A., conditions where the earliest predominate and the difference in each set of cases is exactly the same, i.e., 13.8 per cent. In the charts the ordinates represent the height of the fundus. The abscissae represent the weeks of pregnancy by Nagel's rule. The curves represent the highest, lowest, and average measurements while the cases used and the number of measurements are recorded on each individual chart. These chart curves show certain facts in common as follows:

1. Curves begin at the twenty-fourth week of pregnancy from which this particular study has been made so as to closely follow observations done in the past.

2. Most of the curves give one the impression that errors still exist even in special cases.

3. As weeks pregnant advance height of fundus increases more or less irregularly.

The average curve in special cases always assumes less irregularity in its ascension due to elimination of outside disturbing factors hitherto discussed.

5. Special cases have less irregular and closer high and low curves.

High and low curves approximate within 6 cm. in general material and 4 cm. in special cases.

7. As pregnancy increases high and low curves become more regular and closer to the average in special cases than in general cases, i. e., in late pergnancy measurements are probably more stabilized and less liable to extreme fluctuation.

8. Early curves are more irregular than in late pregnancy which is probably explained by the difficulty of diagnosing the position of the fetus during the early weeks of pregnancy when the fetal heart and fetal movements are the only guides to that position. In this series of cases when the fetal heart was found outside the imaginary vertical line bisecting the distance between the symphysis and the anterior superior spine it was classified as a posterior position, or when motion was felt inside that line it was called a posterior position.

9. Special cases are always more reliable than their corresponding total case chart.

Table I is a complete summary of early and late material in the various positions with the number of cases and measurements used. Following this is a detailed comparison of the rules of Nagel, McDonald, Spaulding and my own with the number of measurements predicting labor within two weeks and within one week. These calculations are then reproduced in percentage. Special cases with their careful expurgations develop into much better results. My rule is better by 5 per cent in two weeks and 10 per cent in one week pre-

TABLE I
PREDICTION OF TIME OF LABOR
NAGEL'S RULE, McDONALD, SPAULDING

or on mad ex ent ely of le. ely A., eh

he reent sed ial

vs:

eial

rly.

em.

oser ure-

ex-

the rior

the sed. on-ore-cu-neir e is ore-

Total Cases O. R. P. Early Late	CASES	CASES MEAS.	PREI	PREDICTED TO	2 WEEKS	KS	PRE	PREDICTED T	TO 1 WEEK	M.	PER CE	CENT TO 2 WEEKS	WEEK	10	PER CEN	PER CENT TO 1 WEEK	EEK
Late	20	1420	Nagel 1429	MeD. 878	25. 25.	My.	Nagel	MeD. 717	Sp.	My. Na 721 10	Nagel N	MeD. 61.3 56	Sp. N	My. Na 62, 72,	Nagel McD 72.0 50.7	Sp. 35.7.	My. 50.4
CONTRACTOR OF THE PARTY OF THE	675	3555	3555	2512	2192	2376	2737	2001	1991	2172 10				37. 77.			61.0
O L. P. Early	301	1626	1626	1071	906	1084	1226	912	816	931 10				36.6 75.			57.5
Late	294	1701	1701	1072	1001	1074	1070	819	799	826 10				33.5 62.			48.
O. R. A. Early	252	1422	1422	892	891	876	1077	791	282	802 10				36.8 75.			55.0
Late	573	1608	1608	1071	686	1072	1396	921	903	942 16				33.7 86			58.
O. L. A. Early	805	2812	2812	1792	1718	1868	2110	1592	1521	1623 10				38.8 75			57.0
Late	609	3405	3405	2261	2167	9270	3007	1961	1905	1969 10				36.6 88			57.4
Breech	231	1105	1105	159	114	171	594	800	92	88 10				15.5 53.			-
Twins	16	580	580	0	0	0	497	0	0	0 10				0 73			0
Cesarean	89	420	420	279	258	280	866	172	170	183 10				36.9 70			43,
Total	4198	19666	19266	11687	11048	12031	14973	61-66	9661	10257	10		55.3	60.7 81	0.02 0.		52.
Special Cases																	
O. R. P. Early	166	831	831	572	495	929	040	554	326								
Late	192	1033	1033	922	901	926	099	835	819								
O. L. P. Early	98	473	473	462	282	465	319	428	324								
Late	8.4	746	746	601	447	621	551	458	440								
O. R. A. Early	72	515	515	413	311	430	407	400	301								
Late	78	456	456	356	273	380	374	318	252								
O. I. A. Early	230	1128	1128	1101	862	1108	086	752	675	940 10	100	98.1 6	67.3	98.2 86.1	1 56.7		
Late	174	1321	1321	1112	1022	1301	1040	881	792								
Breech	99	391	391	46	30	49	312	26	61								
Twins	56	198	198	0	0	0	130	0	0								
Cesarean	35	176	176	116	165	146	106	65	65	29	1					36.9	38.1
Total	1209	7268	7268	5701	4790	8609	5519	4714	3815	5383	1-	75.5 6	64.3 8	61.8 91.5	5 61.5		

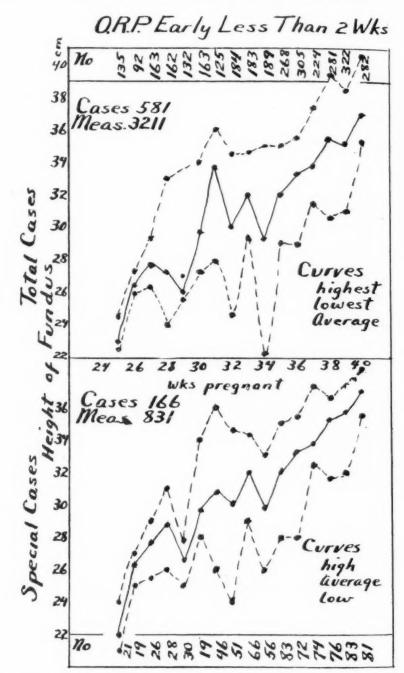


Chart V.—O.R.P. Early. Curves oscillate widely with the high and low far from the average which remains closely in the center line. The mean curves become more steady after the thirty-fourth week but the chart still remains very unreliable regardless of expurgations. Certainly no operative procedure should be considered when the McDonald measurement is the deciding factor.

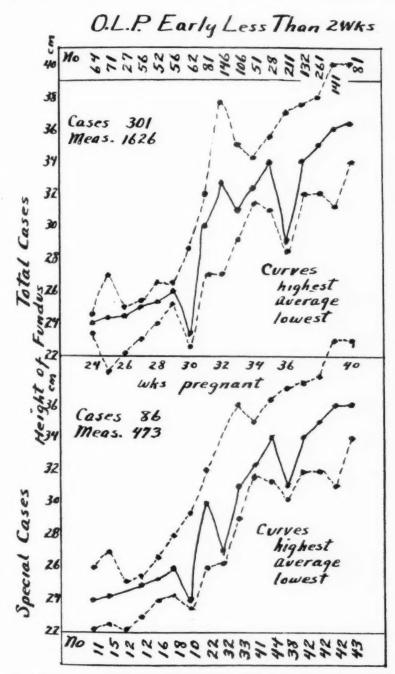


Chart VI.—O.L.P. Early. Presents an average curve closer to the low. fluctuating more widely than the high and low. This chart is more reliable than O.R.P. early with more measurements under than over the average. Even the special case chart fluctuates too widely to be a deciding factor for any operative procedure,

from more gardwhen

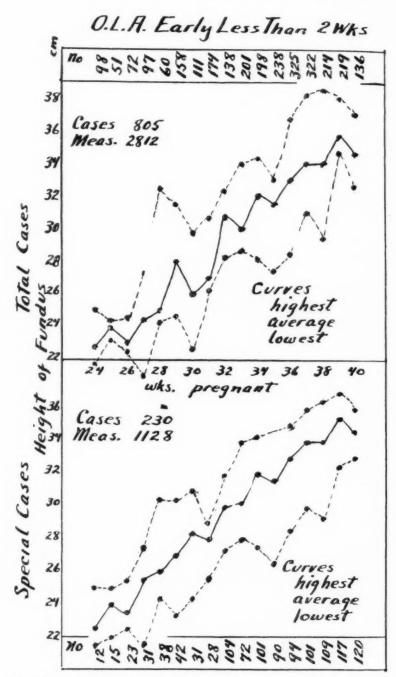


Chart VII.—O.L.A. Early. Curves are reasonably straight with most measurements closer to the high until the thirty-third week. This is a reliable chart with more numerous measurements slightly over the average.

# O.R. A. Early Less Than 2 Wks.

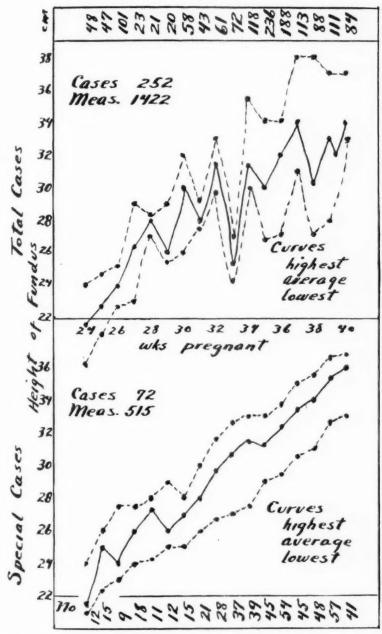


Chart VIII.—O.R.A. Early. Offers reliable high and low curves close together with the average closer to the low. It is very reliable and more apt to have a single measurement slightly below the average.

In the late positions the occiput anteriors are the most reliable and the O.R.P. can be classed as hopeless for our purpose.

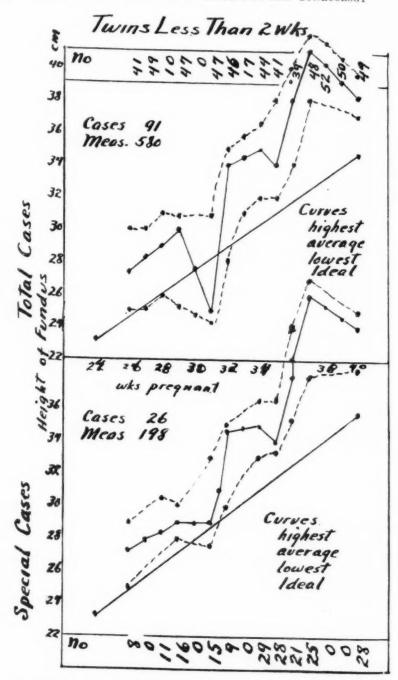


Chart IX.—Twins are all presented in one chart because of a small number. The irregular average curve ascends more sharply than vertex positions, while the high and low curves are reasonably uniform.

Twin measurements evidently vary widely without great uniformity. Their measurements are far above those of the vertex positions and should follow some rule of their own. They are presented here only as an illustration proving that multiparity should be eliminated from our predictions of the time of labor.

### Breech Within 2 Wks.

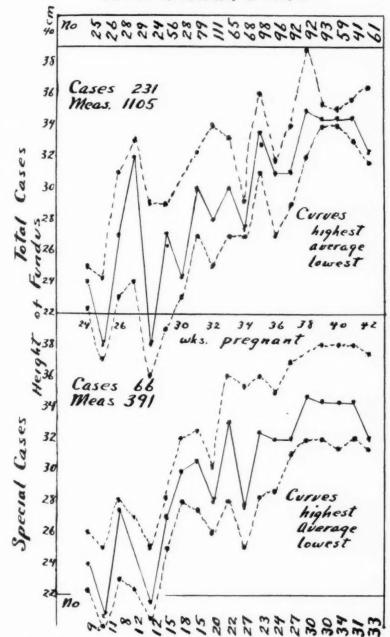


Chart X.—Breech curves are so irregular and fluctuate so widely that practical use of them does not seem fair to science. Such measurements are of no value even with careful elimination of material.

the easrule ulti-

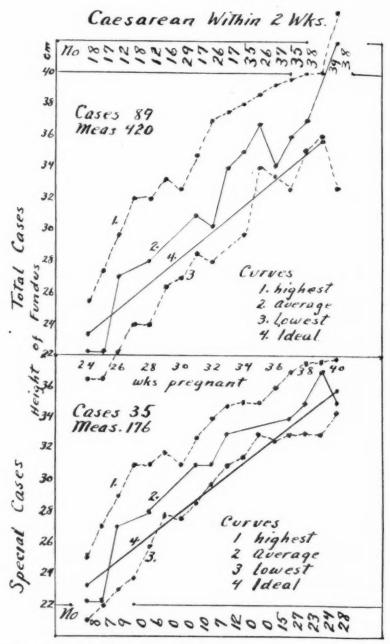


Chart XI.—Cesarean charts consist of all cases without engagement and were so studied for other purposes and include contracted pelvis cases as well as toxemias. The curves are orderly and the average is fairly straight, being somewhat over my ideal curve and reminds me of Spaulding's curve. This curve is too much over my ideal average to be of value, since this material was not carefully expurgated of the usual factors of error and the curve is somewhat like that of Spaulding's. I doubt whether he really used the same extreme care in his measurements.

dictions of labor and all rules are inferior to that of Nagel. Breech and twin measurements are of no value. Leftsided vertex positions are evidently most reliable and all can predict within 70 per cent of the time. With predictions of labor within one week my rule is almost as valuable as that of Nagel which is the only place wherein these two rules can be compared.

### SUMMARY

McDonald first publicly declared the value of this measurement and justly deserves its name. Spaulding published the only real

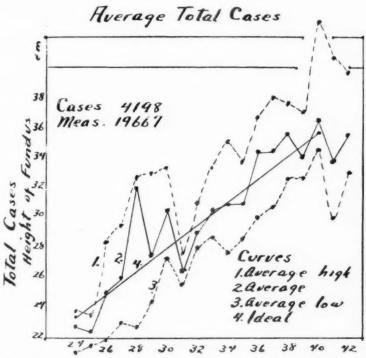


Chart XII.—The average chart of all cases is disappointing with very irregular curves up to the thirty-first week and still fluctuating badly thereafter. It represents many measurements by a variety of observers wihout more than ordinary care in eliminating undesirable factors. This chart is of no value except as a comparison with other charts.

statistical study. Their methods of measuring were practically the same and are followed by mine.

The normal vertex positions, breeches, twins, and a conglomerate mass classified as cesarean sections are used in this study. Breech and multiparity presented very unreliable measurements and were considered hopeless. Cesarean cases were offered to disprove Spaulding's declaration that the uterus has a changing rate of growth during pregnancy. The normal vertex positions gave fairly accurate results,

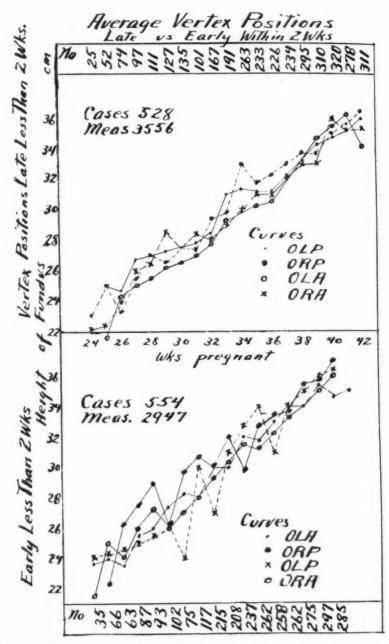


Chart XIII.—Interposed average curves of the early and late vertex positions of the special cases approximate closely. The average of these presents steady reliable curves with the early one predominating over the late curve as one would naturally expect.

## Special Cases Average

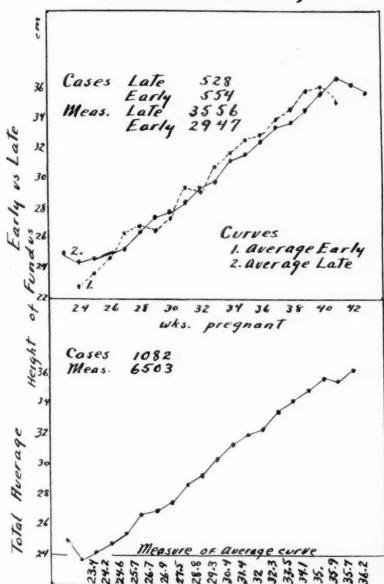


Chart XIV.—The general average has been calculated from the average curves of all the vertex positions wherein the number of cases in the early classification are about equal in number with those in the late and the resultant average is very close to a straight line.

the left side being more reliable than the right, and anterior positions were better than posterior ones. The latter allow the greatest variability and are therefore the least reliable. They fluctuate enough to be called too dangerous for use.

Abnormalities such as full bladder, full rectum, pelvic tumors, hydramnios, breech, multiparity, cord about the neck, abdominal adiposity, ascites, extension of fetal head or spine, all tend to cause oversize measurements, while careless measuring, lightening uterine contractions and uterine suspensions present shorter ones.

At present there is great error in predicting the probable date of

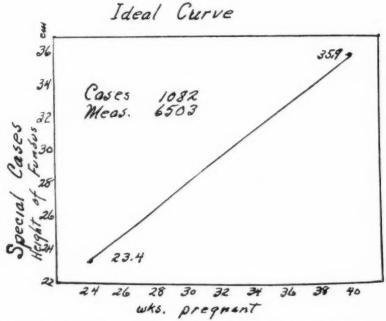


Chart XV.—I therefore present a straight line as nature's probable ideal curve, ascending from 23.4 cm, in the twenty-fourth week to 35.9 at the fortieth week with a definite regular rate of growth which has been so strongly denied by Spaulding.

labor. Nagel's rule missed 13 to 24 per cent. Height of navel from the symphysis varied 10 cm. in different women. Lightening with engagement is unusual and will not predict its proverbial two weeks before labor. Lightening is generally the result of abdominal relaxation without the fetal head engaging. Quickening varied from two to five months and was less accurate than Nagel's rule. McDonald misses in 40 per cent of his predictions. Spaulding is perhaps 10 per cent better. The Ahlfeld rule has not been considered here but has been reserved for future study.

Present formula relying upon statistics are not accurate due to careless measuring, meager materials used, unconsidered factors of error and lack of appreciation of various positions and attitudes of the fetus. No one has compared all methods with one mass of material.

ns

la-

to

y-

li-

se

ne

of

vith

om ith eks kawo ald er

re-

or

We present as new a greater set of measurements than ever before reported, another number personally measured to reduce the factor of error and a comparison of the two showing how one interested observer can decrease the measuring error. Various fetal positions have been studied separately and extreme care in eliminating sources of error were used. We freely admit a possible source of error in diagnosing the position of the fetus in early gestation. Furthermore well-known rules of foretelling labor have been compared with all our measurements. Assuming Nagel's rule as perfect (when in reality he varied greatly) we have checked all rules with his as to common fetal positions and whether the real labor occurred before or after

### Ht of Fundus Vs Wks. Prognant

		wks	Lag of
cm		Pregnan	t Fundus
36	y , a=36-24 cm	38.848	3.848
34	1 d=ht. of funde	37.568	3.568
	6 Ryem	36.188	3.188
32	y= lag of fundus.	35.008	3.008
	.768=4.128768	33.728	2.728
30 0	X+.768=lag of fundus	32.448	2.448
3	behind ht of fundus	31.168	2.168
28	IN / aiy=dix	29.888	1.888
12	1 x=dy/a=.28 ht. of f 6.72	28.608	1.608
26	I wks preg. =(x+.768)+ht. of. f.		1.328
0	= 28 ht. off 5. 95%	26.048	1.048
1 24 .76	& working rule + ht of t.	24.768	
T	wks. preg. = Aht oft - 6.+		
22	mcDonald meas.		
	5 / 2 3 4		

Chart XVI.—Height of fundus vs. weeks pregnant, represents the method of calculating the amount necessary to add to the McDonald measurement to find the number of weeks pregnant. The first column at the right represents the weeks pregnant for each McDonald measure above 24 cm., as represented on the ordinate at the extreme left. The last column tells the lag of the height of fundus behind weeks pregnant and is calculated by subtracting the height of fundus from the weeks pregnant. At the left, the ordinate of the triangle represents the height of fundus or McDonald's measurement and the abscissa corresponds to the lag of the fundus behind weeks pregnant as calculated in the second column. The line b represents the second column graphically starting with the 24 cm. McDonald at 0.768 and ascending to 4.128 at the 36 cm. McDonald measurement. Lines y and a complete a right angle triangle wherein line a represents McDonald measurements above 24 cm. and y plus 0.768 is the lag of the fundus behind the number of weeks pregnant. x represents an arbitrary line perpendicular to a at the point of any given McDonald measurement. Therefore, in any given McDonald, the line x plus 0.768 will equal the lag of the fundus behind weeks pregnant and when added to the McDonald measurement will equal the weeks pregnant. By the triangle we calculate that weeks pregnant equals 0.28 McDonald—6 added to the McDonald measurement will equal the weeks in gestation. This working rule varies about three days from the ideal calculation.

his prediction. Lastly we present the postulation that abnormalities generally present overmeasurements and deny the reliability of  $_{0e}$ -ciput posterior positions.

We leave untouched statistics of the unusual true lightening cases with engagement and some formula for estimating the degree of descent because of the unreliable results obtained. The variability of the convexity of the uterus remains unproved. The differentiation between oversized babies and the abnormalities of pregnancy was eliminated in the original material chosen. Error in the position of the fetus in utero during early gestation probably remains uncorrected.

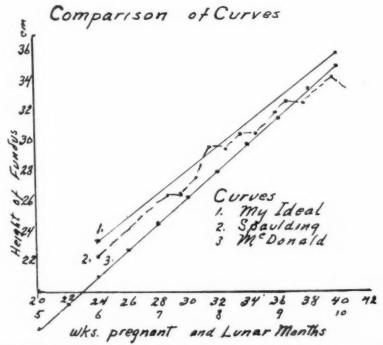


Chart XVII.—Comparisons of my ideal chart with McDonald, Spaulding and Nagel's rule show that McDonald and I agree that the fundus rate of growth is constant, which seems to fit present day theory that the uterus accommodates itself to fetal length which in utero has a definite increase each week according to the formula  $\mathbf{x} + \mathbf{5} \times \mathbf{5}$  equals length in cm. where  $\mathbf{x}$  represents the months of gestation. McDonald and I refuse to recognize a drop in our curves from the thirty-ninth to fortieth week and mention lightening as an unusual condition. I believe Spaulding either did not skillfully estimate the degree of lightening or else he used measurements of the fundus with the uterus momentarily at rest while the patients were in labor, which in my observations often varied 8 cm. above or below my prelabor measurement.

The value centers upon the dependability which we claim is very good providing extreme care is used as to measuring and eliminating possible factors of error. All known or possible errors have been removed to arrive at a definite normal result. The various charts clearly show the difference between single careful measurements and multiple and often slovenly done determinations. Ability also centers

upon continual daily use of these measurements and will no doubt vary some with each individual. In the long run careful measurements are as good as Nagel's rule and each may vary as much as 24 per cent as to accuracy, hence our formula is a greatly to be desired check to cover up the deficiency of Nagel's predictions.

The best method is probably Nagel's rule because it can be determined from the beginning of and does not vary throughout pregnancy. It, however, is not very accurate varying in 5,500 cases from 87 per cent in two weeks to 81 per cent in one week predictions. Our formula in the long run will equal Nagel's predictions but has the disadvantage of being applicable only during the latter part of pregnancy and requires great care in discriminating abnormalities. It is an added tool to the skilled workman and useless junk to the occasional user. As an aid to Nagel's rule to decrease the 13 to 24 per cent chance of error it has been of great value.

I am indebted to many friends who have helped me gather this mass of material. I wish to thank Dr. Geo. Clark Mosher for the use of his clinical material and the valuable suggestions he has given during this study.

#### CONCLUSIONS

Labor can be predicted in a reasonable number of times by means of abdominal contour measurements, provided extreme care is used in eliminating the many possible factors which easily cause great error in results.

Such a method is dependable and as accurate as Nagel's rule after the twenty-fourth week and should be used in conjunction as an arbitrary check to that rule or when the menstrual history has been peculiarly unusual.

Accuracy of prediction depends upon the fetal position and attitude in utero being more reliable in leftsided vertex positions, and those cases coming earlier than Nagel's rule are more accurate than the ones occurring later. Posterior vertex positions are very unreliable and subject to great variability. Certainly no decision as to the method of procedure in an unusual posterior position should be decided by such measurements.

Abnormalities of pregnancy and labor present larger measurements than normal while careless measuring, lightening, uterine contractions and uterine suspensions generally give smaller ones. Undermeasurements are more valuable than overmeasurements because of less chance of error.

Measurements during labor are unreliable.

The uterus in gestation has a definite regular rate of growth throughout pregnancy.

Lastly this rule and abdominal contour measurements are of value only to those who use them daily and practice the art of obstetries rather than occasional midwifery.

- Ahlfeld, F.: Arch. f. Gynäk., 1871, ii, 353.
- Allen: Am. Jour. Obst., 1907, lv, 4.
  Baume: Die Lage des Uterus und Foetus (quoted by Ahlfeld), 1872, Leipzig.
- Blau and Christofoletti: Clinics of Schauta and Chrobak (quoted by McDonald).
- Monatschr. Geburtsch. und Gynäk., 1904.
- DeLee: Obstetries, Philadelphia, W. B. Saunders Company. Fraruer, D.: Über die Bestimmung der Grösse des Kindes vor der Geburt, 1881,
- Hecker and Buhl: Klinik der Geburtsk, 1861, Leipzig, ii, 131-145. Hirst: Obstetries, Philadelphia, W. B. Saunders Company. Issmer: Arch. f. Gynäk., xxx, 277; xxxv, 310. Karb: Ztschr. f. Heilk., 1903, xxlv, No. 4, p. 12.

- Kleinwachter: 1902, viii.
- Krönig und Zweifel: "Die Therapie bein Engen Becken," Leipzig, 1901.
- McDonald, E.: Jour. Am. Med. Assn., December 15, 1906, p. 1979; Am. Jour. Med. Sci., September, 1910,
- Norris: Am. Jour. Obst., 1904, i, No. 3.
- Ostreil: Monatschr. f. Geburtsh. u. Gynäk., 1905, No. 1.
- Perret: Bull. Soc. d'Obst. de Paris, 1898, p. 58; and Obstetrique, Paris, November 1, 1899.
- Pinard: Dictonnaire de Physiologie, 1905 (see Gestation).
- Reed, C. B.: AM. JOUR. OBST. AND GYNEC., 1920, i, No. 1.
- Reid: Lancet, Duration of Pregnancy, 1850. Richelot: Zur Diagnostik der Schwangerschaft, Königsberg, 1868.
- Schatz: Arch. f. Gynäk., lxxxiv, 2; lxxx, 3. Schroeder: Geburtshülfe Vierte Auflage, Bonn, 1874.
- Spaulding, A. B.: Jour. Am. Med. Assn., 1912, i. 746.

- Spiegelberg: Textbook Obstetries. Quoted by McDonald.
  Stone, W. S.: Med. Rec., New York, November 4, 1905, p. 725.
  Suttigen, V.: Obst. Jour. Great Britain, 1875-6, iii, 397.
  Tessier: Memoirs Acad. Roy de Sci. de l'Institute de France, 1819, ii, 1.
- Voorhees: Am. Jour. Obst., 1905, iii, No. 2.
- Walrof, J.: Über Längemessung der Frucht Während des Geburtsaktes, Berlin,

BRYANT BUILDING.

### Department of Maternal Welfare

CONDUCTED BY FRED L. ADAIR, M.D.

### STANDARDS OF PRENATAL CARE

AN OUTLINE FOR THE USE OF PHYSICIANS

- Approved by the Joint Committee on Maternal Welfare of the American Gynecological Society, American Association of Obstetricians, Gynecologists and Abdominal Surgeons, and American Child Health Association

A T a meeting of the directors of the state bureaus of child hygiene held at the Children's Bureau in Washington in October, 1924, it was suggested that a committee from various parts of the country be appointed to draw up standards of prenatal care for the use of physicians at clinics and also those engaged in private work. The Children's Bureau accepted that suggestion and requested Dr. R. L. DeNormandie, of Boston, to form such a committee.

It consisted of Dr. Fred L. Adair, associate professor of obstetries and gynecology at the University of Minnesota Medical School; Dr. Rudolph W. Holmes, associate professor of obstetrics and gynecology at the Rush Medical College, University of Chicago; Dr. Ralph W. Lobenstine, chairman of the medical advisory board of the Maternity Center Association of the City of New York; Dr. Frank W. Lynch, professor of obstetrics and gynecology, University of California Medical School; Dr. Florence L. McKay, director of the division of maternity, infancy, and child hygiene, Department of Health of the State of New York; Dr. James R. McCord, professor of obstetries and elinical gynecology, School of Medicine, Emory University, Atlanta, Ga.; Dr. C. Jeff Miller, professor of obstetrics and clinical gynecology, Tulane University of Louisiana School of Medicine; Dr. George Clark Mosher, chairman of committee on maternal welfare, American Association of Obstetricians and Gynecologists; Dr. Otto H. Schwarz, professor of obstetrics, Washington University Medical School, St. Louis, Mo.; Dr. Annie S. Veech, director of the bureau of maternal and child health, State Board of Health of Kentucky; and Dr. R. L. De-Normandie, of Boston.

The committee appreciates that no group of physicians would agree without qualification upon any set of standards such as has been

attempted, but it does feel that the bulletin covers the essential points in prenatal care which all physicians should be called upon to give their patients.

This article as here printed has been adapted from a publication (153) of the Children's Bureau of the Federal Department of Labor and is also distributed by the Joint Committee on Maternal Welfare, from its office at 2500 Blaisdell Avenue, Minneapolis, Minn., where additional copies may be obtained.

### STANDARDS OF PRENATAL CARE\*

Prenatal care is that part of maternal care which has as its object the complete supervision of the pregnant woman in order to preserve the happiness, health, and life of the mother and child. Therefore all pregnant women should be under medical supervision during their entire pregnancy, for it is only by careful routine prenatal care that pregnancy and labor can be made safer.

- I. The physician at the first visit should obtain the following data and record the facts:
  - A. Patient's past history-
    - 1. Diseases. Question particularly as to the following:
      - (a) Tuberculosis or exposure to tuberculosis.
      - (b) Scarlet fever.
      - (c) Tonsillitis.
      - (d) Rheumatism.
      - (c) Diphtheria.
    - Surgical conditions and accidents, especially abdominal and pelvic operations,
    - 3. Menstrual history-cycle, amount of flow, duration, and pain.
  - B. Character of previous pregnancies and labors. Secure the following data of previous pregnancies in chronologic order:
    - 1. Date of termination.
    - 2. Period of gestation.
    - 3. Complications during pregnancy.
    - 4. Labor.
      - (a) Onset-spontaneous or induced.
      - (b) Character.
      - (c) Duration.
      - (d) Termination of labor. Spontaneous or artificial. If artificial, what method.
      - (e) Other complications.
    - 5. Puerperium.
      - (a) Infection.
      - (b) Hemorrhage.
      - (c) Operations following.

<sup>&</sup>quot;No attempt has been made in this pamphlet to direct actual treatment, particularly for such conditions as nausea or vomiting, preeclamptic toxemia, and the treatment of symbilis during pregnancy. The physician using this outline is referred phases of the work.

### 6. The newborn.

- (a) Alive or dead at birth.
- (b) If dead, macerated?
- (c) Premature or term.
- (d) Breast fed-yes or no. Duration.
- (e) Baby alive now? If dead, give cause of death.

#### C. Present pregnancy:

- 1. Date of last menstruation and character thereof.
- 2. Nausea and vomiting and quickening.
- 3. Estimation of date of delivery.

### II. Then proceed to-

### A. Physical examination.

- Taking and recording of the systolic and diastolic blood pressure, temperature (preferably P.M.), pulse, and weight.
- 2. Skin, nutrition, head, mouth, neck, chest, heart, lungs, breasts, extremities.
- 3. Abdominal examination, palpation, auscultation, mensuration.
- Vaginal examination. No vaginal examination during the last month of normal gestation without strict aseptic precautions. Rectal examination should be substituted.
  - (a) The necessity of a vaginal or rectal examination is insisted upon—
    - (1) To determine the existence of a pregnancy.
    - (2) To determine the position of the uterus.
    - (3) To discover any pelvic tumor.
    - (4) To determine the presence of venereal disease, and if suspected to take smears.
    - (5) Speculum examination of the cervix and vagina is advised in early pregnancy if indicated
  - (b) In presence of vaginal bleeding at any period of gestation only rectal or aseptic vaginal examination should be made.

### 5. Pelvie measurements.

- (a) Intereristal.
- (b) Interspinous.
- (c) External conjugate.
- (d) Diagonal conjugate.
- (e) Transverse diameter of the outlet.
- (f) Palpation of pelvic contours, promontory, sacrum, coecyx, ischial spines, arch, tuberosities.
- 6. Taking of blood for Wassermann reaction,

#### 7. Urinalysis.

Specific gravity. Albumin. Sugar.

A microscopic examination of the sediment is advisable as a matter of routine, and it is a necessity if albumin is present. If there is any evidence of trouble, a 24-hour specimen should be secured.

- III. If pregnancy is determined, then give minute instructions to the patient in the hygiene of pregnancy.
  - A. Diet.
  - B. Exercise, rest, sleep, and re-reation.
  - C. Clothing, including shoes.
  - D. Baths and care of the skin.
  - E. Care of the bowels.
  - F. Care of the kidneys.
  - G. Care of the teeth.
  - H. Care of the breasts.
  - 1. Intercourse during pregnancy.
  - J. Maternal impressions.
  - K. Hygiene of the home and preparation for home delivery.
  - L. Mental hygiene.

Patient should be examined by a physician at least once a month during the first six months, then every two weeks or oftenef as indicated, preferably every week in the last four weeks. A properly qualified nurse working in conjunction with a physician may assist in the observation of the patient. At each visit to the physician the patient's general condition must be investigated, blood pressure taken and recorded, urinalysis done, pulse and temperature recorded, and the weight of the patient taken if possible.

External pelvimetry is only suggestive. It alone does not determine whether or not any disproportion is present. Abdominal examination should be made at each visit and the height of the fundus be determined at this examination. Abdominal palpation in the eighth and ninth months will show whether or not there is any obvious disproportion between the head and the pelvis. Malpositions can be determined and may be corrected. Further information as regards descent and fixation can be obtained by rectal examination.

In a primigravida, if the presenting part two weeks before the estimated date of delivery is not well in the pelvis, the physician in charge should determine, so far as is possible, whether any disproportion between the pelvis and the baby exists. If a disproportion is diagnosed in any case special care should be taken to avoid vaginal examinations immediately prior to or after the onset of labor. This precaution is wise because of the danger of serious infection should operative procedures later become necessary.

Every patient requires careful individual study. If the prospective labor offers a probable chance of being a difficult one, the patient should be sent to a well-equipped hospital for delivery.

Pregnancy is a physiologic condition, but there is no condition which may become pathologic more quickly. It is therefore necessary to instruct each patient at her first visit to report at once to the physician anything that may affect her well-being, especially the following symptoms:

- 1. Obstinate constipation.
- 2. Shortness of breath.
- 3. Acute illnesses, especially colds, sore throat, and persistent cough.
- 4. Persistent or recurring headache.
- 5. Recurring nausea or vomiting.
- 6. Visual disturbances.
- 7. Dizziness.
- 8. Pain in the epigastrium.
- 9. Edema, especially of face, hands, and ankles.

tient

10. Changes in the urine or in the type of micturition.

11. Severe pain in the lower abdomen.

12. Vaginal bleeding, even the slightest.

In case of vaginal bleeding or low abdominal pain the patient must be instructed to go to bed at once and to send for her physician. When bleeding from the vagina occurs its source must be determined by examination. When hemorrhage appears imminent the patient, if possible, should be removed to a hospital, but if vaginal examination is necessary it must be done under aseptic precautions. Where a hospital is not available, means must be at hand to control the possible severe bleeding that may arise.

If the patient develops a toxemia in the course of her pregnancy it is only by careful medical supervision and treatment that an eclamptic condition can be prevented. Eclamptic convulsions are in the majority of cases preventable, but only by constant vigilance combined with cooperation between the patient and the physician can the disastrous results which occur throughout the country be diminished.

If the patient is to be delivered by a licensed midwife, she should have the advantage of the same prenatal care to which all prospective mothers are entitled. If there is doubt about the patient's having a normal delivery she should be transferred to a doctor or to a hospital.

Only by careful study of each case is it possible to determine whether the patient should be allowed to stay at home or be sent to a hospital. By this individual study the number of vaginal examinations during labor may be cut to the minimum and the terrible toll of death from sepsis be much lowered.

It is only by the early and repeated examination of the prospective mother that the premature termination of pregnancies, the stillbirths, and many diseases and deaths of the newborn can be reduced. By the same methods the mothers can be spared much distress and disease, and many lives can be saved which would otherwise be lost from toxemia, accidents of pregnancy and labor, and infection.

the very with phyaken t of

Abhere can

date , so ists, void prepro-

ffers well-

ient her

### Society Transactions

### THE AMERICAN GYNECOLOGICAL SOCIETY

FIFTY-FIRST ANNUAL MEETING STOCKBRIDGE, MASS., MAY 20, 21, AND 22, 1926.

Dr. Palmer Findley, Omaha, Nebr., read a paper on Pregnancy in Uterus Didelphys. (For original article see page 318.)

#### DISCUSSION

DR. CHARLES M. GREEN, BOSTON, MASS.—I can add nothing to this discussion; for I have seen no case of complete uterus didelphys which was pregnant. One perfect case of complete duplicity, from fundus to introitus vaginae, I have seen, however, which was not pregnant. There was a gonococcus infection in one side.

DR. HIRAM N. VINEBERG, NEW YORK CITY.—I am sorry I did not receive a questionnaire because I could have added two cases of double uterus with pregnancy. The first woman went to full term. She had had several pregnancies, one in one uterus and the next in the other, alternating. I saw her also in a case of miscarriage.

A private patient of mine I delivered twice. Both pregnancies went to full term without any difficulty. In the first delivery about the fourth day, the temperature went up to 101.6 and on examination I found that there was considerable decidual tissue in the nonpregnant uterus and when that was removed with the finger the temperature promptly fell.

DR. REUBEN PETERSON, ANN ARBOR, MICHIGAN.—I have had four cases of double uterus in three of which the patients had been pregnant.

The fourth patient was a girl of fourteen. This case illustrates the difficulties of diagnosis mentioned by Dr. Findley. By rectum could be felt what I considered an ovarian cyst but which laparotomy revealed to be a hematoma of considerable size. Before the diagnosis was definitely established, I had done so much damage to the pelvic organs that I was compelled to do a hysterectomy to save her life.

I here present the specimen of a double uterus with one cervix where eight pregnancies had occurred on one side. This double uterus was removed for carcinoma of the cervix. The other uterus is small and atrophic.

I have had two other cases where pregnancy occurred in a double uterus, always on one side, although cases have been reported where pregnancy has taken place on both sides. In one case a cesarean section had been performed, the reason for which could not be ascertained.

I have never seen a case of double vagina or complete doubling of the genital tract in which pregnancy had occurred.

DR. JOHN O. POLAK, BROOKLYN, N. Y.—These cases of doubling of the genital tract are particularly interesting. We have recently seen three cases, since reporting our cases to Dr. Findley, two of didelphys, one of which is now preg

nant four months. This woman had an infected cyst at the lower portion of the vagina which gave rise to intense inflammatory symptoms. This cyst was drained. On exploration this cyst led to an undeveloped cervix and uterus. The other vagina was well developed and led to the pregnant half of the didelphye uterus.

There are two points I would like to make: first, the difficulty of diagnosis for as a rule these cases present no symptoms until they get married, become pregnant or are infected. Secondly, they behave badly following delivery or mis earriage. They often have menstrual disturbances as a result of the bad drainage and from the decidual reactions which occur in the horn which is not the seat of the pregnancy.

A third point is that a rudimentary horn will give rise to all sorts of complications. I had one patient 14 and another 16, both of whom developed hematometra in the rudimentary horn and a pelvic abscess requiring drainage.

in

us

nt.

ive

ne

ve

th

es,

se

m

re

al

he

ch re DR. SIDNEY A. CHALFANT, PITTSBURGH, PA.—I would like to mention one case that shows the value of conservative surgery in these cases. Some years ago we saw a patient with double uterus, double vagina and pus tube on the right side. I removed the tube and ovary and right uterus. About three years later we saw her at the clinic about three months pregnant. Unfortunately, the patient moved from the city when about five months pregnant, so I cannot state the final outcome.

DR. BARTON COOKE HIRST, PHILADELPHIA, PA.—There are two other cases I would like to add. One I saw in consultation. The physician was in a distracted state of mind. He would find a far advanced labor in one examination and then no progress at all in another. The woman had a double vagina and a uterus didelphys. She was delivered spontaneously.

The other patient had atresia of one vagina and an enormous hematocolpos reaching up to the umbilicus, with the two halves of a uterus didelphys perched on top of it; both uteri underdeveloped.

A third case which I reported to Dr. Findley, I left undelivered in Philadelphia, although due. There is a breech presentation and I have recommended cesarean section.

DR. HENRY T. BYFORD, CHICAGO, ILL.—In my own experience in my younger life as an assistant and then later operating myself, I have come across quite a number but never have seen a case that became pregnant. I think a great many of these cases that do not become pregnant, have never been diagnosed, and the proportion of pregnancies may not be so great as the Doctor's investigations seem to indicate.

DR. C. JEFF MILLER, New Orleans, La.—I have opened the abdomen in two cases of uterus didelphys which demanded interference. It is sometimes difficult, even with the abdomen open, to determine which uterus should be removed. In one instance the patient suffered from menorrhagia, and was particularly desirous of having children. I found both uteri apparently well developed, and both ovaries showing slight cystic changes. I closed the abdomen without removing anything, because I felt her chances for children were better without interference. Three days before I left home I operated on another of these cases, in which the chief trouble was dysmenorrhea and metrorrhagia. Laparotomy revealed a large hematocolpos in one side, which made it clear that the metrorrhagia was due to the opposite side. In this instance it was necessary to remove both uteri. I am not inclined to interfere in these conditions as frequently as some authorities advise, and I never operate unless urgent symptoms warrant it.

(To be continued)

### NEW YORK OBSTETRICAL SOCIETY

MEETING OF MAY 11, 1926

THE PRESIDENT, DR. O. PAUL HUMPSTONE, IN THE CHAIR

- Dr. H. N. Vineberg reported a case of Early Ovarian Pregnancy Associated with Uterine Pregnancy. (For original article see page 332.)
- Dr. L. L. Fulkerson (by invitation) read a paper entitled Endocervicitis. A Review of 1,039 Cases, Some Treated with the Cautery. (For original article see page 374.)

#### DISCUSSION

DR. H. B. MATTHEWS.—I would say that the incidence quoted (33 per cent) seems a little bit low. In our work at the Long Island College Hospital and in private practice, covering several hundred cases, 75 per cent showed evidences of endocervicitis.

As regards backache: I believe that chronic endocervicitis is a definite cause for backache, for in those cases treated either by the cautery or by operation, but more particularly by operation, the backache, as well as the leucorrhea, has been relieved.

There are four ways of treating chronic endocervicitis. The antiseptic treatment was credited with 12 per cent of cures, which I would say is entirely too high. The cautery treatment in the superficial infections following childbirth, the early postpartum cases, from 3 to 15 or 20 months, cures a very large percentage. We followed 226 of those cases, and 70 per cent were relieved of all symptoms, including the discharge. The deeper cauterizations done under anesthesia (any deep cauterization should be done under anesthesia, because there is enough parametrial reaction to necessitate rest in bed if you are to get good results from the cauterization), were followed in 65 per cent by relief of symptoms.

I was surprised to learn that the fourth form of treatment, operation upon the cervix, was used in only 25 of the very many cases studied. I was also a little bit disappointed that he did not refer particularly to the Sturmdorf procedure, which, we believe, is the procedure par excellence in the cure of the majority of these cases, in that it cures the leucorrhea, relieves symptoms, such as backache, and clears up the parametritis or uterosacral cellulitis that follows chronic cases. In a recent report of mine before the American Medical Association I showed that 70 per cent were cured and 22 per cent were markedly relieved. We furthermore proved that pregnancy and labor following this operation were not interfered with any more than in an ordinary trachelorrhaphy.

DR. G. G. WARD.—There has been an increase of interest among gynecologists as to the importance of diseases of the cervix. A symposium at the recent meeting of the American Medical Association was devoted to the subject, and it was well received.

We must appreciate the fact that from such an exhaustive analysis as this we are able to make deductions that are of real value. Instead of having opinions based upon tradition, these ideas are based upon an actual study of recorded facts.

The particular interest that I have in this subject is from the standpoint of its being an etiologic factor in cancer of the cervix. We realize that the statistics compiled by professional statisticians show that cancer is increasing progressively, and that a large percentage is uterine cancer.

While Dr. Fulkerson reported only one case of carcinoma in this large series, still he does not know how many cases which were treated might have developed carcinoma later if they had not been cured of their endocervicitis. I think the majority of authorities agree that the chronic irritation that exists in all these cases undoubtedly is a predisposing factor in the development of cancer.

Dr. Farrar and I have recently been studying some 300 cases of cancer at the Woman's Hospital, and in that series over 95 per cent have borne children or had abortions, thus showing that probably trauma of some type may have had an effect upon the cervix that might have predisposed to cancer.

We have a follow-up at the Woman's Hospital in the Obstetrical Division where the patients return for examination each month for three visits; they are checked up with a visual examination at their final visit. We believe that a great many erosions will be thus discovered and treated which would otherwise be ignored. There is a recent tendency among obstetricians to resort to immediate repair of a laceration of the cervix at the time of labor. We do an episiotomy and repair it immediately and we can place a stitch in the cervix with practically the same degree of safety if we do it under proper conditions, such as those found in the delivery room of a hospital. I believe if this is done that we will be able to prevent erosions of the cervix which cause these subsequent troubles. I think that this is something worth serious consideration, as possibly it will do away with a great many of the causes of erosion that may ultimately lead to cancer.

DR. W. P. HEALY.—It seems to me that cancer incidence is too important to be avoided in a paper of this kind, especially since the doctor emphasized the fact that endocervicitis was not a factor, in his series at any rate, in the possible production of cancer. That is contrary to the belief of those of us who are dealing with cancer.

Dr. Fulkerson did, however, bring out a point which I think is probably the important one, and that is that endocervicitis as he observed it from the age standpoint occurred in those who were rather young, the average in his series being about 33½ years, whereas cancer tends to occur a little bit later, the average age for cervical cancer being over 40.

The point I have in mind is this: We must endeavor to avoid the development of cancer, by teaching these women how to avoid it, or to do something that will prevent it, and I am firmly of the opinion that in the young woman in the child-bearing period of life when we still want to preserve the cervix for the purpose of pregnancy, that the very best treatment for those cervices, and the safest for the patient, is the actual cautery.

I feel that silver nitrate is a good deal of an irritant and possibly does more damage than good on the whole, and irritation is bad.

On the other hand, I am also of the opinion that in the older woman who is forty years of age or older—practically, we might say, beyond the child-bearing period—that any disease in the cervix may be treated much more radically than with the cautery alone, because then you have a persistent organized lesion, whereas in the earlier years you have a rather subacute inflammatory lesion, and I feel at that time the best treatment is complete removal of the cervix, or at any rate, the removal of the diseased tissue.

Asage

erery.

ent) prindo-

for nore ved. nent The

folling iza-

rere

the bit ich, ses,

ent ent hat ore

up

ists ing vell DR. FULKERSON (closing).—In reply to Dr. Matthews, I was referring to the Sturmdorf operation when I spoke of the inadvisability of operative procedures in the treatment of endocervicitis because of the tendency to produce abortion and dystocia in labor. In the April, 1926, issue of the American Journal of Obstetrics and Gynecology there is a case report of rupture of the uterus following the Sturmdorf operation, and I believe other instances of dystocia have been reported.

Emmet's trachelorrhaphy is undoubtedly a desirable operation where inflammation does not exist or after it has been cured, if there is a condition that requires repair. The point I wish to emphasize particularly is that in this series of clinic cases 65 per cent of patients were cured by the cautery method; while a great many of the uncured cases were not followed up and probably could have been cured by second cauterizations. It seems that nearly all the cases could have been cured by the cautery method if they had been sufficiently followed up and recauterized.

Another point I wish to bring out is that mutilating operations of any kind on the cervix should only be done in a small percentage of cases, about the percentage that is shown in this series, perhaps 25 out of 1000 cases, and that that proportion of cases of cervicitis might require operative treatment to cure the condition.

In reference to Dr. Ward and Dr. Healy: there is no intention on my part to try to disprove the fact that chronic inflammation tends to produce cancer anywhere in the body. That is a generally accepted view. It is only that if cancer does follow endocervicitis, the endocervicitis exists so long before the cancer age that there is plenty of opportunity for the gynecologist to cure it by the cautery method before malignancy develops.

Dr. Joseph Hofbauer, of Baltimore, Md., (by invitation) presented a paper entitled **An Experimental Study of the Toxemias of Pregnancy**. (For original article see page 159, August issue.)

#### DISCUSSION

DR. G. W. KOSMAK.—It seems to me that the Society should consider itself honored to have Prof. Hofbauer come here and demonstrate to it in so interesting and conclusive a manner the experiments which he has recently carried out. The experiments demonstrate very well how the empiric treatment of these toxemias of pregnancy that we have followed in recent years is, or may be, proved by an experimental basis in fact.

One thing after another has been tried in the treatment of toxemias of pregnancy and abandoned as the clinical results have failed to come up to our expectations, but I think the points which Prof. Hofbauer has brought out tonight should lead us to continue further the conservative treatment which has become the vogue in recent years. We have followed these conservative methods in a way without really knowing why, but the clinical values which have resulted from their employment and the points that have been brought out should lead us to continue with this form of treatment rather than to go back to the more or less radical measures that we have employed in the past.

I believe that if Prof. Hofbauer's views hold (and I have no doubt that they will, and that other things will be brought out in the course of time to support them), then it will be a disgrace for any obstetrician to be compelled to terminate pregnancy either in the early months for hyperemesis or in the latter months for eclampsia, without having resorted to some of these proved facts.

An interesting point that Dr. Hofbauer made in the beginning of his paper and a point that should be circulated very much more widely than it has been, is the asso-

the

s in

and

RICS

urm-

tion

pair, s 65

the

cond

the

l on

tage

tion

try

e in

llow

e is

fore

ted

eg-

self

ing

The

of

eri-

nev

but

to

ent

ow-

the

eat-

em-

vill,

m),

eg-

np-

d a

ciation of premature separation of the placenta with a toxic process. It is true, we have all admitted it more or less. In the recent years it has been attributed to various etiologic factors, including placental infarcts, but Dr. Hofbauer's slides have shown us very well just what takes place and he has also demonstrated by his confirmatory animal experiments what the basis of this possible placental separation is.

DR. HAROLD BAILEY.—Some of the slides presented I could substitute in my own teaching course, as they are almost indistinguishable from the specimens of the human liver in the toxemia of early pregnancy and of eclampsia.

It is interesting, in regard to our knowledge of histamine, that Dr. Abel first thought that it was the active principle of the posterior pituitary gland. It causes, I believe, a preliminary rise in blood pressure and later vasodilatation, and these two points could hardly be correlated until Prof. Hofbauer told us of the work of Dale, which shows that histamine stimulates the adrenals. In accidental hemorrhage we see very much the same thing; at the start, perhaps with only minute doses of the toxin escaping into the blood stream, there is a tremendous rise in blood pressure, sometimes as high as 240. I might mention the fact that there is seldom a year in which we do not have a patient of this type die on the table. They are particularly and peculiarly susceptible to shock which may occur after only a moderate operative procedure.

Two other substances produced in the upper part of the intestinal tract act in a like manner, namely, secretin and cholin. Attempts have been made to prove that secretin and histamine are one and the same.

As far back as twenty years ago, in the Pharmocological Department of Cornell, under Prof. Hatcher, the subject of cholin was brought up and discussed. We were especially interested because of a case of toxemia of early pregnancy. The charts all showed a very high rise in blood pressure following the cholin injections, and later fatal shock. It is possible that this was a vasodilatation produced by putrefaction in the intestinal tract.

DR. HOFBAUER (closing).—I agree in every way with the remarks made by Dr. Kosmak.

With regard to Dr. Bailey's statements, it must be borne in mind that the blood supply of the brain is mainly controlled by the splanchnic system through the vasomotor centers in the medulla and the midbrain, which react to the slightest degree of anemia. Consequently, it is quite likely that a certain distention of the vessels in the splanchnic area might give rise to shock-like conditions. As regards the presence of cholin in the blood, there is one point to which I wish to call your attention. About four years ago, I had the opportunity of working in Doederlein's clinic in Munich, where I introduced a supplement to the local radium treatment of cancer of the uterus, namely, the application of a stimulating dose of x-rays to the region of the hypophysis preceding the local cervical treatment. Apart from a definite increase in the number of eosinophiles and red blood cells a higher titer of the cholin content of the blood could be demonstrated by biologic tests after the radiation of the hypophysis. These observations illustrated that some connection must exist between the activities of certain duetless glands and the constituents of the blood, which are known to play a significant part as factors in producing a power of resistance to disease, particularly the infections and carcinoma. On more than one occasion Doederlein emphasized the point that the new method of treatment may account for the improved general condition of the patients, as well as a considerably higher percentage of cures.

### BROOKLYN GYNECOLOGICAL SOCIETY

STATED MEETING, DECEMBER 4, 1925

## Dr. Wm. C. Meagher reported a case of Chorioepithelioma with Pulmonary Metastases.

L. L., female, aged twenty-two years, married, admitted to Greenpoint Hospital, May 20, 1925, complaining of pain in both lower quadrants, foul discharge from vagina, and headache. In the early part of November, 1923, she was curetted at home for a hydatidiform mole. One week later she was admitted to Kings County Hospital, where, on November 19, 1923, a salpingo-oophorectomy and appendectomy were performed. For four months patient felt very well and then began to complain of headache, which came on suddenly, was constant and dull aching in character, and persisted up to admission to hospital. Coincident with the onset of the headache, was the beginning of the sharp pain in both lower abdominal quadrants, which was aggravated upon walking. In August, 1924, patient began to bleed profusely, but gradually the amount diminished until there was but a daily spotting and passage of small clots, which in turn were replaced by a gray, foul-smelling discharge, the latter having been in evidence for one month, at the time of admission.

Patient has had chronic cough for five years, had night sweats once, ten days before, hemoptysis once, one and one-half months before, and has lost twenty pounds in the past two months.

Menstrual history normal. No change in habit or type until one year previously. First child three years before. Second, a premature, living four days, two years before. Both spontaneous deliveries and no postpartum complications. No miscarriages. Frequent micturition at night.

Physical examination, May 21, 1925, disclosed a fairly well-nourished female. Chest, slight dullness over the left upper lobe posteriorly. Abdomen, slight umbilical hernia, midrectus sear below umbilicus with small hernia presenting through the sear. Slightly rigid in both lower quadrants. An irregular mass is felt below the umbilicus extending to the symphysis and about two inches on either side of the midline. This mass is tender and indurated and seems to be attached to parietal peritoneum anteriorly. Vagina, introitus parous, dirty gray, malodorous discharge; old laceration of a soft cervix that presents an external os sufficiently patent to admit the tip of one finger. The fundus is about the size of a twelve weeks' pregnancy, fixed, and very tender. Tentative diagnosis, chronic degenerative fibroid uterus.

On June 15, examination of the chest revealed many moist râles over entire right lower lobe, scattered areas of moist and crepitant râles over right middle and upper lobes, and marked pleural friction rub in the infraclavicular space on the right side. Sonorous, sibilant, and crepitant râles were heard over the lower left lobe.

The temperature was normal on admission, reached 102° during the course of the disease and was 97° before death; pulse rate ranged from 84 to 160; respirations were 20 to 60.

Urinalysis varied, showing at times a faint to a heavy trace of albumin; occasional pus cells to many; once red blood cells, and once granular casts. The frequent blood counts showed a progressive increase of white blood cells and polys from

10,200 to 22,400 of the former and 73 per cent to 84 per cent of the latter. The hemoglobin on Tallqvist estimation showed a gradual decrease from 65 per cent to 40 per cent. The red cells ranged from 3,744,000 in the first count to 2,480,000 in the last. The blood culture was sterile on two occasions. The Wassermann was negative. Blood urea, 25.2 mg.; creatinine, 1.9 mg. The sputum and stool were both negative for tubercle bacillus.

'X-rays of the chest revealed the following: May 22, apices clear, lung fields show no definite infiltration or opacity; June 17, lung fields show considerable amount of infiltration, suggesting tuberculosis. Other clinical data must be considered before diagnosis of tuberculosis is made.

The patient died July 7, 1925, after forty-nine days in the hospital.

ul-

ital,

rom

at

nty

my

om-

rac-

the

nts.

ro-

ind

lis-

on.

avs

ads

ly.

ars

ar-

le.

cal

ar.

ili-

ne.

ımı

12.

ip

nd

ht

er

le.

he

ns

nt

The uterus was extensively traumatized upon removal. It is symmetrical and measures 12x15x12 cm. The serous coat over the fundal and anterior wall shows dense adhesions of omentum. Scattered throughout, but especially marked on the posterior wall, are gray-white and brownish zones, round or oval, varying from 3 to 10 mm. in size. The anterior wall and the fundus are firm; the posterior wall is soft. The uterine cavity was filled with gray-white and tuberous masses which are friable, opaque and necrotic. Upon incision these masses extend irregularly through the uterine wall as discrete ovoid nodules ranging from 2 to 10 mm. Many of these have reached the serous coat. The anterior wall is most extensively involved and presents as an opaque, solid mass filled with tumor tissue. In this region the wall measures 6.5 cm. In other regions the wall measures 2 to 2½ cm. in circumference.

Microscopically, sections from the compact zone of the anterior wall show complete necrosis. All vestiges of muscle have disappeared and structure of the organ is lost save for several thrombosed vessels. Necrotic débris, blood, fibrin, and karyor-rhetic particles are present. Scattered through the periphery of the necrotic mass are islands of degenerating tumor cells. Many of them are recognizable as Langhans' cells occurring in thin sheets of 4 to 6 cell layers. Syncytial cells are not positively identified.

Through the less affected zones of the uterus with the discrete nodules grossly noted, the findings are essentially as above. Blood, fibrin, and necrotic débris comprise the bulk of the tumor. Scattered through are degenerating and necrotic tumor cells. At the periphery they are better preserved. In the lumen a peripheral vein detached lumps of Langhans' cells are present. The outer third of the uterine wall is well preserved, likewise the fasciculi of muscle and connective tissue. Section from the cervix shows normal cervical glands and injected vessels. The metastatic focus lies deep in the muscle zone. Its features are the same as those in the body.

Diagnosis.-Chorioepithelioma of uterus.

Tube markedly thickened and indurated, measured 16 cm. in length. In its outer third it fuses insensibly with a parovarian cyst, so that only the abdominal ostium and fimbriae remain. The latter are markedly thickened and indurated. On section the tube lumen is narrow and mucous folds are normal. The muscle coat is markedly thickened and shows several injected vessels. The parovarian cyst is ovoid and measures  $10x7\frac{1}{2}$  cm. It is lined by injected and thrombotic epithelium. Its wall is fibrous and hemorrhagic.

Ovary enlarged and irregular and measured 5x4.5x2.5 cm. Its medial aspect presents an ovoid cyst projecting from the free border and measuring 2.5 cm. Consistency is firm and color is gray-white. On section, cortex presents follicular cysts, the largest of which has been grossly noted. The medulla is dense, firm, and selerotic. At the hilum of the ovary lies an almond-shaped, hemorrhagic metastasis measuring 25x10 mm.

Microscopically the tube lumen and its nucous folds are normal. The muscle layer shows marked edema and in foci is nucoid. The hemorrhagic areas noted on gross appearance are the result of interstitial bleeding. Congestion of all vessels is prominent.

The parovarium has lost its lining epithelium. Its walls are comprised of fibrous tissue and muscle fasciculi markedly separated by edema and interstitial bleeding accounting for the injected mucosa on gross examination.

The ovary presents advanced sclerosis of tunica with cortex only moderately involved. All cysts are of the granular type. Primordial follicles are scant. Medulla is thickened and filled compactly with large and small sclerotic veins. No evidences of theca interna cysts are present. Capillaries are prominent.

Lungs are both normal in form. The surface is studied with firm, reddish-white nodules, measuring 10x24 mm. in size. On section they present either clusters or discrete nodules invading or replacing pulmonary alveoli. The adjacent lung tissue shows congestion and compression. Involvement is diffuse and rather uniform throughout.

Microscopically the nodules are necrotic and all traces of lung or tumor have disappeared. Blood and fibrin are encountered. At the periphery of the nodule clusters of pale cells with vesicular nuclei are interpreted as Langhans' cells. Syncytial cells are not defined. The adjacent pulmonary tissue shows at lectasis.

Diagnosis.-Chorioepithelioma of lung.

#### DISCUSSION

DR. O. A. GORDON, JR.—Chorioepithelioma is in some places considered a comparatively common condition, but this is decidedly not true. It is considered so because of the great difficulty in diagnosing the condition histologically. The absolute rarity of this condition may be estimated from the fact that Dr. Symmers at Bellevue Hospital has done something over 5,000 autopsies on women during his time there, and has discovered but two cases of chorioepithelioma, one a doubtful case with vaginal metastasis, and the other an authentic case.

Undoubtedly if chorioepithelioma was as common as it is sometimes reported, death would be a fairly common occurrence, because it is a very malignant neoplasm. The confusion arises from the fact that chorionic villus has no definite location. Even in normal cases it sometimes circulates freely in the blood stream and possibly lodges in the lung and is destroyed there by the lytic action of the blood. Therefore, many cases are reported as chorioepithelioma that are not so in fact.

As to the histologic diagnosis of this tumor; if the tumor is limited to the uterus, the best authorities maintain that histologic diagnosis alone is not sufficient; that its resemblance to the normal chorionic villus is so close that the diagnosis cannot be made absolutely on the histologic findings.

A word as to the treatment of this condition, which Dr. Meagher did not consider in the report of his case. Many eases are subjected to unnecessary hysterectomy following hydatidiform mole in which there is a suspicion of chorioepithelioma.

In 1917 Dr. Vineberg emphasized that vaginal hysterectomy was a good procedure in suspected cases. It has also been emphasized in suspected cases that abdominal hysterectomy should be done as a final procedure before hysterectomy, and of late it has been pointed out (and it seems to me it is a most rational form of treatment) that radioactive substances should be of great value in suspected cases of chorioepithelioma, because the tumor is composed entirely of embryonal tissue which succumbs readily to radioactive substances, especially the x-ray.

DR. C. A. GORDON.—I believe that radio activity applied to this tumor in the uterus would not be good. Although it is true that radium has a specific action on embryonal tissue, it also, as I understand it, has a specific action on endothelium and blood vessels, and although the tumor itself is making rapid progress in the blood vessels, radium in the uterus may still further break down the blood vessels and speed the tumor on its way.

I agree with Dr. Gordon that histologic examination of tissue from the uterus is absolutely of no value in diagnosis.

An interesting thing is that no metastasis was reported in the vagina, which is as a rule the first place the tumor will show metastatic growth.

In regard to operation for tumor of this sort; although Dr. Gordon calls attention to its great malignancy, and this is largely true, I am sure figures will show that a tumor is of varying malignancy, and a great many cases have been reported of cure after operation, and cases have been reported where apparently miracles have been performed, where the growth in the uterus disappeared after operation on metastasis, and where operation was abandoned during its course because it was felt it was futile.

### AMERICAN MEDICAL ASSOCIATION

SEVENTY-SEVENTH ANNUAL SESSION, DALLAS, TEXAS, APRIL 19 TO 23, 1926

DR. GEORGE GRAY WARD in his Chairman's Address pointed out that the union of obstetries and gynecology is essential if we are to expect better obstetric research, as the physiology and pathology of the reproductive system of women must be considered as a whole if we are to solve successfully the problems which are so interwoven with both sciences. The intimate relation between obstetries and gynecology which exists in European clinics has, unfortunately for both branches of the specialty, not found universal application in this country. Gynecology in its beginning was largely reparative, and therefore surgical, and its tendency was to develop independently for this reason. But in recent years there has been an awakening to an appreciation of the broader gynecology, which comprises all phases of the reproductive function and of which surgical therapy is but a part.

In preventive obstetric measures lie the means of avoiding many gynecologic lesions. If the general practitioner will but do his full duty towards his obstetric patients, more than half of the work that is now done by the gynecologist will not be necessary. This will require the earnest attention of the obstetrician not only during the labor but also in the antenatal and postnatal periods.

The gynecology of today has undergone a great, expansive change from the gynecology of yesterday, which was largely confined to the narrow field of operative technic. This broader development which has taken place is largely the result of the application of the fundamental principles of physics and chemistry in the study of life processes, and through the sciences of biology, biochemistry and genetics a better appreciation of the intimate relations existing between the reproductive organs and the body as a whole has been brought about.

The entire program of the first day was devoted to Cervical Disease.

om-

be-

scle

on

s is

rous

ling

in-

ulla

nces

hite

or

ssue

orm

disters

lute ellecime case

ted, ism. ion. ibly ere-

that t be

fol-

lure inal e it ent)

epimbs

### Dr. Carey Culbertson of Chicago read a paper on Erosions of the Cervix Uteri.

He pointed out that leucorrhea is apparently a precursor in the development of erosion, causing the maceration and disintegration of the squamous epithelium of the portio. Then follows the appearance of glands, cervical in type, the papillary form of erosion. Attempt at spontaneous healing is represented by the reappearance of layers of flat epithelial cells, over the glandular structure and proliferation of these cells into the dilated gland lumina. The so-called follicular erosion resembles a cervical mucous polyp which has prolapsed into the vagina and taken on, again, a covering of flat epthelium and such a development has a relation to further epithelial proliferation and malignancy.

### Dr. C. Jeff Miller of New Orleans discussed Chronic Endocervicitis.

He pointed out that endocervicitis is a definite clinical entity of such common incidence and such grave potentialities that many writers do not hesitate to affirm that it causes more loss of time and more inconvenience to those affected with it than does any other gynecologic condition. He believes that there is no gynecologic affection which is the subject of more misdirected and more unsatisfactory treatment. The obvious cause for most of our poor results is that past treatment has been directed along irrational and illogical lines in that it was directed toward manifestations of the disease rather than its underlying pathology.

The etiology of chronic endocervicitis is still far from clear. Many of the cases are undoubtedly due to specific infection, some from direct contact, some from a childhood infection which was possibly so mild that it passed unnoticed. The normal external os has to some extent the faculty of the internal os of prohibiting the entrance of pathogenic bacteria, but when injuries occur, such as becrations from childbirth, or, less frequently, from careless instrumentation, this is no longer the case, and the gaping, open os and exposed mucosa offer an easy avenue of access for whatever bacteria may be present.

Practically all types of bacteria may be identified in chronic endocervicitis, but certain types are predominant. The gonococcus, the streptococcus, the staphylococcus and the colon bacillus are believed to occur in order of frequency, while mixed infections are not uncommon.

The pelvic manifestations are more usually in the ovaries than in the tubes and parametritis is frequent, particularly in association with posterior cellulitis.

The symptomatology of the disease is various and is often complicated by the fact that when the patient reaches us we are dealing not only with endocervicitis but with associated or resulting pathology which may entirely overshadow the original lesion. The most constant symptom is a leucorrheal discharge, but menstrual derangements are not uncommon. Backache and dyspareunia are not ordinarily present unless there are associated displacements or parametrial involvement, particularly posterior cellulitis, with extension to the uterosacral ligaments. Sterility is a frequent complication, owing to the plugging of the cervical canal by tenacious mucus or by the thick cervical mucosa, or by the destruction of the spermatozoa by purulent secretions. Constipation is frequent, and systemic manifestations will vary according to the severity of the disease.

The structural pecularities of the cervix, its frequent exposure to trauma and infection, and its faculty of harboring bacteria over long periods of time, all emphasize the fact that local, superficial treatment is worse than useless, and that any methods which are to succeed must be directed towards the underlying pathology of the deeper cervical structures.

## DR. HARVEY B. MATTHEWS of Brooklyn discussed The Sturmdorf Operation vs. the Cautery in the Treatment of Chronic Endocervicitis.

In comparing the results of the cautery treatment with the Sturmdorf enucleation operation for the cure of chronic endocervicitis it seems fair to state that cauterization is, for the majority of cases, an office procedure, whereas the Sturmdorf operation requires hospitalization or its equivalent with an anesthesia—local, regional or general.

Cauterization is primarily a prophylatic measure that, if properly employed early in the course of chronic endocervicitis, will obviate the necessity of operation later when the infection becomes more widely and deeply disseminated.

Cauterization is more successful in those cases where the infection is superficial and the lacerations are not extensive. There is a type of hyperplastic cystic endocervicitis encountered during the childbearing age (infection of long standing) in which cauterization is contraindicated because of the resulting scar formation with possible stricture or stenosis of the cervical canal. The Sturmdorf operation will remove the infected cervical mucosa with its glands and is, therefore, preferable.

Cauterization is most successful in destroying the infected cervical mucosa after the menopause or preceding supracervical hysterectomy where further menstruation is impossible.

The Sturmdorf operation is primarily indicated in those cases not suitable for canterization, i.e., infection of long standing, deeply disseminated with cystic changes, encountered during menstrual life.

Pregnancy and labor are not interfered with in any way by the superficial and moderately deep cauterization of the cervix. The deep and more extensive cauterizations under anesthesia, naturally, are more apt to cause complications during pregnancy and labor, although 6 cases of 55 cauterized under anesthesia had perfectly normal labors.

Pregnancy and labor, after the Sturmdorf operation, are not any more interfered with than by trachelorrhaphy. Out of a total of 28 pregnancies after the Sturmdorf "cone" operation, there were 17 normal labors, 3 had moderate cervical dystocia but delivered normally, 1 had low forceps, 1 had cesarean section, the indication for which was not the cervix, 6 cases aborted (cause not found in the cervix).

## Drs. Budd C. Corbus and Vincent J. O'Conor of Chicago presented a paper on Diathermy in the Treatment of Gonorrheal Endocervicitis.

To obtain success in the treatment of gonorrheal endocervicitis through the use of diathermy, one must maintain a clear perspective of the object sought for, i. e., destruction in situ of the thriving gonococcal organisms which are imbedded in and protected by the tissues of the cervix. At the same time, the destructive agent should not produce or cause any permanent injury to the endocervical canal.

Gonococci frequently disappear permanently from the urethra during respiratory infections, and the same thing has been noted during the pyrexia of typhoid. It has been demonstrated that the gonococcus is instantly destroyed at a temperature of 113° F. (45° C.), or at 104° F. (40° C.), prolonged for six to eight hours.

Since the normally nourished epithelial cell can survive a temperature of 118° F. (47.8° C.), for one hour, and connective tissue cells even higher temperatures for longer periods, the rationale of the therapeutic possibilities for destroying the gonococcus within the living tissue by heat is manifest.

Endocervical diathermy is contraindicated, however, during pregnancy and in the

is.

ion

he

of the

rm

of

er-

07

lial

irm it it eathas mi-

nal the rom

for

but eeus fec-

and

the but nal de-

frecus

ary

and emany of early acute stages of infection or when active pelvic inflammatory changes, such as salpingitis or pelvic cellulitis, are present.

The authors use the cervical electrode for periods of thirty to forty minutes at a temperature of 116° to 117° F. (46.5°-47° C.), but occasionally continue the treatment for sixty minutes or longer with a varied reduction in temperature.

They pointed out that in order to be successful in the cure of gonorrheal endocervicitis, infection in the urethra, Bartholin's and Skene's glands must also be eliminated.

Treatments must be continued until it is definitely proved that the gonococcus is permanently climinated from the tissues.

The clinical results obtained by the careful application of this method have been demonstrated to their complete satisfaction in the management of approximately 150 patients during a period of more than six years.

### Dr. George Gellhorn of St. Louis discussed Syphilis of the Cervix.

Ten years ago syphilitic lesions of the cervix were considered so extremely rare as to be without any practical importance, but it is now recognized that the cervix may be the seat of syphilitic manifestations in every stage of the disease.

The hard chancre of the cervix is usually located upon the anterior lip. If engrafted on a preexisting erosion, it may more or less completely surround the external os, but even then the anterior lip is definitely more involved than the rest. While the primary lesion on the outer genitals presents and retains its characteristic and pathognostic aspect, the chancre of the cervix undergoes a rapid and variegated evolution from an uncroded induration to an ulcer which in turn either heals quickly or transforms into an inconspicuous erosion. In the stage of greatest development, it appears as a more or less deep, funnel-shaped sore with thickened, rounded edges which slope down to a smooth floor of a glistening, brown color. A greyish or white pseudomembrane, composed of necrotic tissue, and, therefore, firmly attached, covers the base of the ulceration, and a thin red or reddish-brown line encircles its periphery. There is usually very little, if any bleeding, even on manipulation. Multiple chancres are not exceptional.

There is no inflammatory reaction in the surrounding tissues; yet the entire cervix is often larger and harder from a general indurating edema and, when exposed in a speculum, fairly jumps into view. On account of this general infiltration the typical parchment-like induration of the base cannot be mapped out, except in pregnancy when the cervical tissues are softened, or in prolapsed uteri where palpation is more easily accomplished.

The histologic picture is that of any chronic inflammation and is itself by no means pathognostic unless one succeeds in demonstrating the Spirochete pallida in the tissues.

The cervical sclerosis has no particular symptomatology. For this reason, the discovery of a primary lesion on the cervix is largely accidental, and it is probable that most cervical chances are entirely overlooked.

The Wassermann reaction does not become positive until two or three weeks after the establishment of the chancre. Spirochetes, however, can easily be found in the scant secretion of the sore.

In the secondary stage syphilis manifests itself upon the cervix in the form of macules, papules, and ulcers. These forms represent three successive stages in the development of lesions caused by scattered accumulations of the Spirochete pallida in the squamous mucosa of the cervix. They usually are multiple and associated with similar lesions in various parts of the vagina and the outer genitals.

The essential tertiary lesion is that of a gumma. The histologic picture is essentially the same as in primary or secondary lesions. The process may involve the vagina or extend into the cervical canal, and is frequently associated with similar lesions elsewhere. The consistency is firm but becomes soft under the influence of tissue necrosis. The most characteristic color is yellow, though various other shades may be observed. Bleeding or profuse mucopurulent discharge is present; but pain is usually absent. The lesions may heal spontaneously with formation of scar tissue, but more often specific treatment is required. Local treatment is altogether useless.

# DR. GRANT E. WARD of Baltimore discussed Radium in the Treatment of Cancer of the Cervix Uteri as Now Used in the Howard A. Kelly Hospital.

He compared the later statistics with those of former years.

Improved methods in technic have increased the percentage of cures in all groups, with the exception of the borderline. These were regarded as inoperable, Classifying the operable cases treated with radium alone, those treated with radium plus operation, and those treated prophylactically after operation as all operable, they have a total of 24, of which 14 were well when last seen. This gives a total clinical cure in the operable class, using operation and radium, of 58 per cent, against 57 per cent in those treated with radium alone. As stated above, many of the cases in this series are below the five-year period, but he feels that they warrant these conclusions when compared to our former statistics. In a further communication it is hoped that all cases treated in the Howard A. Kelly Hospital prior to five years ago, will be reviewed and the absolute five-year cure noted. In this last series of 141 inoperable cases, there resulted 43.2 per cent improvement; 28.3 per cent healing of the primary growth; and 11.2 per cent clinically cured. A clinical cure has been realized in 47 (20.2 per cent) of the 232 cases treated, including all classes of patients-operable, operated after radium, recurrent after operation, prophylactic after operation, borderline, radium and cautery, and inoperable. Of those treated by radium alone, i. e., the operable (not operated), borderline, and inoperable, 28 out of 174 or 16 per cent are clinically cured.

# Dr. F. W. Lynch of San Francisco reported his Five-Year End-Results as of March, 1926, in 107 Cervical Cancers Treated with Radium or by Operation between March, 1916, and March, 1921.

Three cases only were lost from the follow up and only after three years' observation. His own observations and a critical study of the literature convinces him that three years' freedom from recurrence is not a proper definition for a permanent cure. He has twice as many three-year as five-year cures. His review of the literature shows that there were only 2 per cent to 5 per cent of recurrence after five years in the large series treated by the modern radical operation in spite of the fact that these series contained almost 50 per cent of borderline cases. The reported results of operable and borderline cases treated with radium closely parallel those of Bumm, who found one-third less cures after radium than operation when followed for six years, and more cures by radium than surgery when the same cases were followed for only three years.

Lynch finds that the best results with radium are in the inoperable cases which in the past were abandoned to die. Even in the seemingly hopeless cases, there are 3 per cent to 10 per cent of five-year cures. Lynch reports his radium results in 59 inoperable and borderline cases upon whom no operation had been performed for cancer. One inoperable case only was lost to view when well three and one-half

en 50

t-

0-

he

vix en-

est.

are

stic ted kly ent, ges nite

ers

ph-

rvix n a ical incy

no a in dis-

fter

that

n of the llida iated years after treatment. Two patients died from intercurrent disease without evidence of cancer at two and one-half and three years after treatment. Six died from cancer three to five years after treatment, while five, or 9 per cent, are well five to seven years after treatment. In contrast with these he finds in the literature up to present time only 306 operable cases radiated only and with only 40 per cent of cures. Since radium cures so many apparently hopeless cases and so few operable cases, it does not seem as if radium would solve the treatment of operable cases and that it is more than likely that vital forces in the body have much to do with the cure. Future improvements must be along biologic lines.

His study shows that the ordinary panhysterectomy is absolutely contraindicated. He reports 23 cases upon whom competent surgeons had performed panhysterectomies and for whom he gave radium as prophylaxis or for early recurrence. Every case was dead from cancer within four years. Two cases radiated after cervical resection had shown cancer are still living five years after operation.

On the contrary, he collected from the literature 2,103 cases treated by modern radical operation with operative mortality of 16.7 per cent. In spite of the fact that this group represents 50 per cent to 60 per cent of all the cervical cancers applying for treatment while the series was developing, there were 42.1 per cent cures. He believes that since the results of surgery for operable and borderline cases actually exceed those of radium alone that more cancers can be cured if operable cases are operated after radium and all others are treated with radium alone, after developing body defences by blood transfusions and general systemic measures. Weibel shows five-year cures by surgery in 87 per cent of the early operable cases and in 53 per cent of the other operable cases. This should be contrasted with the radiual cures of only 40 per cent. Lynch has operated 36 cases radically with four deaths, Seventeen come in the five-year period. There were three operative deaths. Two cases were lost when well after three and one-half years. Eight cases are well five and one-half to ten years after operation. He also operated an inoperable case which had been made operable by radium. This patient is still alive seven and one-half years after operation. He is uncertain as to which therapeutic measure deserves the credit. On the contrary, he has radiated five operable cases, one of which died from heart disease and three from cancer between three and four years. One only sur-

There were 27 per cent of cures by all methods for three years and 16.8 per cent for five years.

## Drs. R. L. Dickinson, New York, and William H. Cary, Brooklyn, presented an Analysis of the Cures and Failures in the Treatment of Sterility.

Several thousand clinical histories of sterile unions, recorded by living expert students of the subject, are available for combined systematic analysis—particularly of the items absent in publications, such as charted correlation of causes, and reasons for success or failure. Certain essential researches on human semen, insemination and ovulation are defined, and their study is begun. In both matters organized work is called for.

Any tubal testing, treatment, or operative procedure for sterility that is done on a wife, before the present condition of the husband is determined, should, in these days, carry the stigma of malpractice.

Semen defects appear to account for one-third of sterile marriages, one-fourth of these defects offering hope of betterment. Adding his contribution of venereal infection may bring the husband's responsibility up to one-half, and charges up to him the least curable of the wife's sterilities, tubes scaled by inflammation.

With the present tests of tubal patency, and the hoped for determination of the day of ovulation, artificial impregnation may come up to the large claims made for it.

Curability of the woman in the opinion of representative gynecologists ranges from one chance in seven with closed tubes, to one in three in more favorable conditions. With careful selection, and by persistence in treatment it is shown that even better results may be obtained. Thus we may be able, after eliminating the grossly incurable, to relieve eventually one-half of the sterile unions.

## DR. DONALD MACOMBER, Boston, discussed Low Calcium as a Cause of Intrauterine Mortality.

He pointed out that diets low in calcium do not produce sterility in the adult rat but affect the fertility by increasing the intrauterine mortality.

In the rat pregnancy makes relatively small demand on the mothers because the young are largely cartilaginous at birth. Even where the diet is very low in calcium the fetus is normal at birth both in weight and calcium content. To a certain extent it acts as a parasite upon the maternal organism and draws its calcium from her reserve. This is shown by analysis of the maternal calcium, by x-rays of the bones and by the specific decalcification of the teeth.

In the rat all these effects are intensified by lactation. The mother rapidly loses calcium from her body to supply the needs of the growing young; but the young are now not able to get all they need and soon show signs of a lack of calcium by stunting, weakness, and often death. This is to be contrasted with the fetal ability to live at the expense of the mother. The difference is probably not however due to a physiologically different principle, but to the much greater needs of the growing young and the increasing resistance of the maternal organism to sacrifice its reserves. That this is perhaps so is shown by the fact that low calcium causes the death of the fetus even late in pregnancy with the cow.

Lastly there is, it seems, a real lesson to be drawn from this study in regard to the dietetic management of pregnancy and lactation. There must be an adequate source of calcium in the diet of the pregnant and the nursing woman if these functions are to be carried out normally and with a minimum of such disturbances as caries, stillbirths and failures of lactation.

# Dr. Harold A. Miller, Pittsburgh, reported the Postpuerperal Morbidity in a Series of One Thousand Cases, from which the following conclusions are available.

First: postpuerperal morbidity occurs much more frequently than is generally supposed. If evenly divided every postpuerperal woman would be a sufferer in at least one particular.

Second: a fully dilated cervix is one which is retracted over the fetal head and not one which is spoken of as dilatable.

Third: operative deliveries of any character seem to increase the postpuerperal morbidity and are to be condemned even though we entirely disregard the immediate danger of infection, except where absolutely necessary to preserve the life of mother or child.

Fourth: temperatures during the puerperal period, even though slight, leave in their wake some definite evidence of damage having been done.

Fifth: the now existing postpuerperal morbidity would seem to justify a return to the rational noninterference in the normal woman and the avoidance of all fetal distress, uterine inertia, or disproportion.

ed. ec: ery

m

ta

to

of

le

nd he

nat ing He illy

rn

opbel in um ths.

five nich nalf the

ent

yn,

pert arly sons

tion ized

e on hese

h of nfechim Sixth: attention to cervical injuries will markedly lessen the discomfort of the patient and in cases of erosion may have an influence on decreasing malignancy.

Seventh: make postpuerperal examinations after each delivery.

### Drs. W. C. Danforth and C. E. Galloway, Evanston, discussed Retrodisplacements of the Uterus During Pregnancy and the Puerperium.

About one woman in five in a series of private patients had retrodisplacement during pregnancy and the puerperium. Retrodisplacement during pregnancy, provided an intelligent vigilance is exercised, need cause but little trouble. Twenty-nine per cent of those seen by the authors were replaced and subsequently supported by a pessary. The remainder corrected spontanously. Fourteen and four-tenths per cent showed a backward position at eight weeks postpartum. Replacing the uterus and supporting it by a pessary at this time aids the process of involution but does not invariably cure the displacement permanently.

Dr. Carl Henry Davis of Milwaukee discussed the problems pertaining to the **Thyroid in Pregnancy**, giving data on the basal metabolic rate and the blood calcium.

He pointed out that approximately 41 per cent of the last 520 women examined in early pregnancy had visible hypertrophy of the thyroid. Eight of these patients have returned with typical symptoms of toxic goiter within fourteen months after delivery. Small doses of iodine have been administered during pregnancy but none after delivery. No patient has returned with hyperthyroidism earlier than four months after delivery. Overwork, worry and other nervous strain appear as contributing causes in each case.

The use of iodine during pregnancy by women who live in goiter districts is advocated unless they have adenoma of the thyroid. Iodine hyperthyroidism is recognized as a possibility but thus far has not been observed. The average metabolic rate of nine women with normal thyroids at term was +2.4 per cent. Their average after delivery was -1.3 per cent. The average rate of seven women with simple hypertrophy was +22.1 per cent before term with a later drop to +3.1 per cent. The average rate of nine women believed to be of the hyperthyroid type was +32.2 per cent before delivery and a drop eleven days postpartum to +8.9 per cent. With the exception of two in the last group, these patients took small doses of iodine during the last months of pregnancy. Patients previously operated upon for toxic goiter are usually benefited by taking small doses of iodine during pregnancy. One such patient in the small group under observation apparently could not tolerate iodine.

One patient had a successful operation for adenoma of the thyroid in the fourth month of pregnancy and later took iodine. One patient with a history of toxic adenoma took iodine during pregnancy with apparent benefit although she had a metabolic rate of +86 at term. She was successfully operated upon twenty days postpartum. The baby was continued at breast and complementary feedings were stopped six days after the operation. The subsequent history of both mother and infant is very satisfactory. Prolonged nausea and vomiting in one case was evidently due to a crisis of exophthalmic goiter. The metabolic rates on this patient are given. She had a rate of +81 per cent ten days before delivery. Her nausea was lessened by the use of iodine.

Patients with toxemia of pregnancy had low readings. Three with edema and little or no albumin had lower readings than the single patient with high blood pressure, albumin and casts but no edema. Comparative studies of the blood calcium and thyroid function as indicated by the basal metabolic rate show no relation between the milligrams of calcium in each 100 c.c. of serum and the metabolic rate. The calcium determinations in twenty-four women with uncomplicated pregnancy showed an average of 9.97 mg. before delivery and 10.5 eleven days postpartum. Most of these women had taken calcium salts in addition to their food. The average for the individuals with thyroid hypertrophy was slightly higher than the average for the women with normal thyroids, but a small series does not warrant conclusions. Three patients with toxemia of pregnancy showed a lowering of the calcium postpartum while the normal patients usually showed an apparent increase within eleven days. The use of cod-liver oil and ultraviolet light did not appear to increase the blood calcium in the few cases studied.

The observations made thus far suggest that if a woman with a normal thyroid has sufficient iodine during the course of a normal pregnancy her basal metabolic rate will remain within normal limits although it may show a slight increase toward the end of pregnancy. Metabolic rates which are well above normal limits are believed to indicate abnormal function of the thyroid, usually of slight degree. The return to normal limits within eleven days postpartum, while the rule, does not prove that the increased rate did not signify an abnormal function. These patients should be kept under medical observation for a long time after delivery. Many of the so-called neurotics of the past probably had disturbed thyroid function.

# Drs. Robt. Mussey, Wm. A. Plummer, and Walter Boothby of the Mayo Clinic discussed **Pregnancy Complicating Exophthalmic Goiter and Adenomatous Goiter with Hyperthyroidism**.

e

ır

1-

0.

ic

re

le

ne

er

he ng

er

ch

th

ic

21

re

nd

vi-

ent

sea

lit-

69-

A study was made of all pregnant women whose pregnancy was complicated by these diseases and who were examined at the Mayo Clinic during the ten-year period from Jan. 1, 1916, to Jan. 1, 1926. Out of this group of 5,043 women examined and operated upon for exophthalmic goiter during this period only 32 were pregnant. Since approximately 70 per cent of patients having adenomatous goiter with hyperthyroidism are more than forty years old, while about the same percentage of patients with exophthalmic goiter are less than forty years old, the proportion of women pregnant while having the latter disease is slightly greater than that of the former.

Of the 7,228 women in the two groups only 42 (0.6 per cent) were pregnant. This rare coincidence confirms Markoe's statement, made in 1918, that of approximately 100,000 pregnant women at the New York Lying-In Hospital only 8 appeared to be suffering from hyperthyroidism. This data can further be contrasted with that given in a report from the Mayo Clinic by Mussey in which 1.9 per cent of women operated upon for appendicitis and 1.7 per cent of those operated upon for disease of the gall bladder were pregnant.

In the cases of this series there is no evidence that pregnancy influenced the course of exophthalmic goiter. In only two of the 32 cases could the onset of the disease be considered with reasonable certainty to have developed during pregnancy. Of the 32 patients with exophthalmic goiter, 23 were delivered at term, 2 aborted, 2 were delivered prematurely, 2 are now pregnant, and three have not been traced.

In considering the methods of treatment used for the relief of exophthalmic goiter in cases of pregnancy the patients are divided into two groups: those treated before the introduction of iodine as a therapeutic aid in the control of exophthalmic goiter (20 patients) and those treated after this period (12 patients), which dates from the spring of 1923. Eighteen of the first group received some form of operative

treatment. In the second group the use of iodine obviated the necessity of any preliminary ligations. Thyroideetomy was performed on 7 after their symptoms had improved under treatment with Lugol's solution, and three were carried through pregnancy on Lugol's solution without operative interference. Two patients receiving Lugol's solution are now under observation.

All of the 10 patients having adenomatous goiter with hyperthyroidism became pregnant after the onset of the hyperthyroidism. All but one of the mothers had some form of operative treatment. One of them died, and 9 were delivered of normal, living babies.

The authors find that the course of pregnancy and the maternal and fetal mortality were not appreciably affected as a result of the syndrome due to exophthalmic goiter or to adenomatous goiter with hyperthyroidism nor, on the other hand, did the pregnancy render the control of these two diseases noticeably more difficult.

### Dr. J. Earle Else of Portland presented a comprehensive paper on Tuberculosis of the Ileum.

With this condition there is a symptom complex consisting of irregular, mildly cramplike pains persisting over a considerable length of time accompanied by tenderness somewhat diffused and most marked in the lower right quadrant, anorexia, low fever, malaise, relieved by fasting but recurring as soon as the patient begins to ent again, nervousness and some abdominal distention in a patient having either pulmonary tuberculosis or a history of such. The finding of blood and pus in the stool increases the probability. A differential diagnosis between tuberculosis of the cecum and tuberculosis of the ileum alone is difficult to make. The differential diagnosis between ileac tuberculosis and acute appendicitis depends upon the chronicity of the former and the acuteness of the latter.

The author reviewed the results of operative treatment and urged the subsequent use of heliotherapy and iodine. The general hygienic measures used in the treatment of tuberculosis should be followed.

## DRS. J. P. PRATT, Detroit, and Edgar Allen, Columbia, Mo., discussed Clinical Tests of the Ovarian Follicular Hormone.

The estrous cycle of animals is not completely analogous to the human menstrual cycle. One thing is common to both, i. e., periodic growth. In spayed animals the ovarian hormone can completely substitute for the ovary and bring about all the typical changes of estrus.

In monkeys thirteen series of injections were completed in five spayed monkeys. Two or three injections were given daily to insure nearly continuous action. Typical reddening and swelling of the vulva and surrounding region and reddening of the nipples have been induced, also characteristic changes in the vaginal epithelium. Considerable growth has been induced in the uterus. In seven of ten series bleeding followed discontinuance of injections in three to seven days.

In women four groups of eases were studied. 1. Artificial menopause. 2. Natural menopause. 3. Primary amenorrhea. 4. Scanty menstruation.

There were five series of injections in women with both ovaries removed. The results noted were growth of the uterus during the period of injections followed by regression when the injections ceased. Associated with the growth there were subjective symptoms of pressure and a feeling of weight in the pelvis similar to that previously noted.

The changes in natural menopause are largely subjective. Therefore, too much

emphasis is not to be placed on apparent results in this group. In all cases injected there was diminution in the intensity and frequency of hot flashes.

The effects of injection in primary amenorrhea are less striking. A slight amount of growth occurs, but there are no other constant findings.

Scanty menstruation does not meet ideal experimental conditions, for there is no accurate measure of the function of the existing ovary. The response in this group was variable. One patient who had formerly menstruated scantily once or twice a year was brought to menstruate regularly and more profusely than ever before.

The same person, however, had been treated with thyroid extract two years before with the result that menstruation became regular but remained very scant. This case illustrates the possibilities of the inter-relation of the duetless glands.

From these experiments, combined with earlier ones on lower animals, the following conclusions are made:

- 1. The ovarian follicular hormone starts the periodic growth processes in the female genital tract.
- 2. In case ovulation occurs, the corpus luteum in woman, and perhaps in other primates, may continue this anabolic endocrine influence which probably decreases as the next menses approach.
- 3. Menstruation seems to be partly due to the temporary absence of this secretion after it has been acting a certain time.
- 4. But since ovulation followed by corpus luteum formation often does not occur, a specific secretion of the corpus luteum is not a necessary causal factor in the menstrual cycle. That the corpus luteum may possibly have a regulatory influence is not questioned.
- 5. This same substance or a very similar one is probably secreted by or stored in the placenta. Its continuous availability throughout the gestation period would account for the absence of menstruation during pregnancy.

# Dr. James C. Masson of Rochester, Minn., discussed Myomectomy, Hysterectomy and Radium in the Treatment of Uterine Fibromyomas.

If fibromyomas do not cause symptoms, no treatment is indicated. Radiotherapy is indicated for all patients over forty who have fibromyomas less than 15 cm. in diameter, with menorrhagia as the chief complaint. It is also indicated if the patient is under forty and refuses surgical removal, or if a major operation would carry an added risk. It is also indicated in all cases of fibrosis uteri, or cases in which there are essential uterine hemorrhages.

Surgical treatment of fibromyomas is indicated for most patients less than forty, for most patients with pain or irritability of the bladder, for patients with tumors more than 15 cm. in diameter, for those whose tumors are of the pedunculated or submucous type or are undergoing degeneration or inflammation, for those whose tumors may not be fibromyomas, and for those with complications that require opening of the abdomen.

Abdominal myomectomy is the operation of choice for the majority of patients less than forty. Vaginal myomectomy is indicated if the fibromyoma presents through the cervix. Subtotal abdominal hysterectomy should be performed in women less than forty years of age only when it is necessary to remove the greater part of the body of the uterus and when the cervix is in good condition. Total abdominal hysterectomy is the best operation when any lesion other than carcinoma exists in

lid

m

th

v.

1.1

r-

ir-

lly er-

eat oulcool

osis the

ient ient

rual the

the

sed

keys. pical

the lium.

tural

The by sub-

much

the cervix and the abdominal operation is advisable, or when the history suggests the possibility of malignant change in the fibromyoma or an associated malignant condition in the body of the uterus.

## Dr. John Osborne Polak of Brooklyn summarized in a lantern demonstration the present status of the **Toxemias of Pregnancy**.

The fact that nausea and vomiting of greater or lesser degree occur in over 50 per cent of pregnant women is evidence that there is temporary disturbance of the physiologic balance of the majority of women who become pregnant. Continuous vomiting causes rapid dehydration and rapid emaciation by starvation, lowers the blood pressure, gradually increases the rapidity of the pulse, diminishes urinary output, increases the concentration of the body fluids, and causes the development of general toxic symptoms similar to those found in extreme starvation.

In the mild cases relief may be secured by hygienic and dietetic management. Should the vomiting persist the patient requires rest in bed with absolute isolation, and the fluid loss must be made up by hypodermoelysis, enteroelysis and the intravenous injection of glucose solutions with or without insulin. When glucose alone, or in combination with insulin, fails to produce improvement, small blood transfusions of 300 c.c. of human blood by the direct method, to which is added 500 c.c. of normal saline solution, has given satisfactory results.

The author states that in his clinic it has not been necessary to empty the uterus on account of vomiting for a period of nearly five years.

## Dr. J. P. Greenhill discussed Eclampsia at the Chicago Lying-In Hospital, giving immediate and late results.

Among the 78 cases of eclampsia analyzed there were 6 maternal deaths (7.7 per cent). If we deduct one moribund, untreated case, the mortality is 6.5 per cent. In 50 per cent the convulsions began before labor, in 20.5 per cent during labor, and in 29.5 per cent after delivery. The maternal mortality for these groups was 10.3 per cent, 0 per cent, and 8.7 per cent, respectively, and the fetal mortality was 41 per cent, 18.8 per cent, and 17.4 per cent, respectively.

The incidence of operative deliveries was 62.5 per cent. While 36.3 per cent of all the labors terminated spontaneously, labor, however, had been induced in 11.3 per cent of them. Hence, only 25 per cent of the patients had both a spontaneous onset and spontaneous termination of labor.

Convulsions ceased after delivery in 78.2 per cent of all the cases where they began ante- or intrapartum. Among the 15 abdominal cesarean sections convulsions began before operation in 12 and in all of these cases the convulsions ceased after operation.

The maternal mortality for the various forms of delivery was as follows: Spontaneous, 3.4 per cent; cesarean section, 6.7 per cent; forceps, 9.5 per cent; and version and extraction, 14.3 per cent. The fetal mortality for these groups was as follows: Forceps, 9.5 per cent; abdominal cesarean section, 17.6 per cent; version and extraction, 28.6 per cent; spontaneous, 30 per cent, and vaginal cesarean section, 100 per cent.

Among the 78 patients, 59 per cent had no prenatal care at all, 23 per cent had very poor observation during pregnancy, and 18 per cent had good prenatal care.

There were five pairs of twins (6.4 per cent). Among the 83 babies there were 23 deaths (27.7 per cent). The fetal mortality of the 75 babies that were alive

when their mothers entered the hospital, however, was only 20 per cent. Of the 15 dead babies which constitute this 20 per cent, only one weighed more than 2,000 grams (4 pounds, 7 ounces). Only 62.7 per cent of all the babies weighed 2,000 grams or more.

Of the 72 patients who left the hospital alive, 60 (83.3 per cent) were traced. Of this number two died of chronic nephritis, 3 now have chronic nephritis and 55 (91.7 per cent) are well. Among eighteen subsequent pregnancies ten ended normally and one is now in progress. One patient had another attack of eclampsia and three had precelamptic symptoms for which the pregnancies were ended. Hence, among the patients who completely recovered after the attack of eclampsia, 26.7 per cent of those who subsequently became pregnant developed signs and symptoms of toxemia. These patients again recovered completely.

the ous the

di-

n-

per

outof

ent. ion, tra-

one, sfue.c.

erus

-In

per cent. and 10.3

as 41

nt of 11.3 neous

they lsions after

Spon-; and ras as ersion n sec-

t had are.

were

### Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

### Selected Abstracts

### Cesarean Section

Baumm, P.: Suprasymphyseal Delivery and Its Field of Usefulness. Monatsschrift für Geburtshilfe und Gynäkologie, 1923, Ixv. 5.

Baumm reports the results of his last 133 cases of cervical cesarean section among a series of 7,018 labors (1.9 per cent). Two of the mothers died, a mortality of 1.5 per cent. One of these women died of air embolism on the operating table and the other died of infection. These good results were obtained despite the fact that 52 patients were unclean; that is the membranes had been ruptured a long time, many had fever and some even foul-smelling liquor amnii. Of the 135 children (2 twins) three could not be resuscitated. Eight more of the children died before the mothers left the hospital, but seven of these deaths are attributable to the fact that the operation was performed too late. Hence in the interest of the child a cesarean section should be performed early. Likewise, in the interest of the mother early operation should be performed, because of the 43 patients whose convalescence was disturbed, there were 34 who had been listed as unclean cases before operation.

Of the 133 patients operated upon, there were 30 who had their second cesarean section, 5 who had their third, and 1 who was delivered a fourth time by the cervical cesarean section. In general, these operations were no more difficult than those done the first time.

Nearly all the operations performed by Baumm were extraperitoneal (Latzko). The peritoneum was torn in 69 of these cases, however, and in general it might be said that during extraperitoneal cesarean section the peritoneum is torn in about half the cases. No harm results from this injury.

The chief indication for the operation is a contracted pelvis. Other indications are placenta previa, habitual death of the fetus before term and primary atony of the uterus. Operating before the onset of labor had no bad effects.

J. P. GEFENHILL

Brandt: Ten Years of Suprapubic (Cervical) Cesarean Section. Zeitschrift für Geburtshilfe und Gynäkologie, 1923, lxxxvi, 564.

From a series of 105 cases occurring in 6,860 labors, the author draws the following conclusions: Extraperitoneal cesarean section shows a preponderance of technical difficulties over the intraperitoneal operation. The loss of time is not considerable. In most cases the child was delivered in 5 to 10 minutes and the operation ended in half an hour.

The transperitoneal procedure cannot stand as an independent method, but niust be classified as extra- or intraperitoneal, accordingly as the peritoneal opening is closed before incision of the cervix, or is left open. The extraperitoneal operation must be divided into pure extraperitoneal and limited extraperitoneal. To the latter belong those cases in which an accidental opening into the peritoneum is closed before opening of the uterus. One disadvantage of the extraperitoneal method is the formation of adhesions, which may cause difficulty on a repetition of the operation. Another disadvantage is the danger of laceration of the peritoneum in head presentations, when the cervical opening is too small and retractors are held too firmly. Here exists the danger of spilling infectious material into the peritoneal cavity. Infection is no contraindication to extraperitoneal section. In extraperitoneal section, the separation of the peritoneum is made easier if the woman has been in labor for some time and the cervix has been obliterated to some extent. The author suggests the name "sectio suprapubica" as an inclusive term for all abdominal cervical sections. Trendelenburg position is not necessary. The longitudinal abdominal incision allows a good exposure of the operative field and because of its simplicity is to be preferred to all others.

Because of its decreased danger of life, cervical cesarean section may have a wider indication than the classic. Even with a dead child, section may be indicated to rescue the mother.

18

nd

at

ne.

he

at

an

rly

TAS

eal

ne

0).

h

out

ons

of

für

ol-

ch-

id.

ion

ust

18

Only in cases of infection or when hemostasis of cellular tissue cannot be assured, should drainage be employed. The placenta should be removed through the incision,

The cervical scar is very strong. Two layers of sutures are sufficient. The mu-

Lumbar anesthesia is preferred. Undesirable action upon the child has not been observed.

Caution should be exercised in performing section after outside operative interference in contracted pelves because of the high fetal mortality.

Induced premature labor should be employed only in multiparae who already have living children; in all other cases, after a test of labor, section is indicated.

MARGARET SCHULZE.

Essen-Möller, E.: The Place of Cesarean Section in Obstetrics. Acta Gynecologica Scandinavica, 1923, ii, 244.

The author believes that the classic and cervical cesarean sections are equally safe for the mother and the child in noninfected cases, but that the cervical cesarean is technically more complicated. It is not yet settled whether the subsequent clinical course is equally simple and undisturbed after the former as after the latter, and with regard to the strength of the scar, it is not yet possible to decide whether the cervical section is to be preferred. The classic cesarean still has its field when it is necessary to deliver the fetus quickly, in placenta previa where severe hemorrhage is feared, and in old primiparae who have no prospect of becoming gravid again.

The classic cesarean section is contraindicated in infected cases unless one intends to perform a Porro operation. It must yield to the cervical operation by means of which it will no doubt be possible to avoid embryotomy on the living fetus even in infected cases. Regarding the two cervical operations the experience gained up to the present time seems to indicate that there is not much choice between them as far as results for the mother are concerned. There is possibly a slight preference for the transperitoneal operation. Regarding the children, the transperitoneal section is decidedly superior to the extraperitoneal and it is, therefore, to be preferred, especially as it is undoubtedly simple technically.

Despite the good results obtained with the cervical cesarean there is still a field of usefulness for the Porro operation. Indications for the latter operation are vaginal atresia and extreme stenosis, and obstructing myomata. In definitely in-

fected cases one may still question whether in some cases the Porro operation does not give the mother a better chance than the cervical section.

In a series of 132 cesarean sections there were 9 fetal deaths (6.8 per cent), but 7 of these infants were dead before delivery, their mothers having had eclampsia and abruptio placentae. One was a monstrosity, hence in reality of 124 cases there was only 1 fetal death and this was due to hemorrhage from the cord, the result of defective ligation.

At the Lund Clinic induction of premature labor has been discarded in favor of cesarean section at term. Nearly all the patients are given a test of labor, but if a patient has previously had dead children due to dystocia, a cesarean section is performed early in labor or even before the onset of labor, regardless of whether the pelvic measurements show a contraction or not.

Cesarean section is performed in cases of eclampsia where the condition of the mother necessitates speedy delivery and where at the same time the cervix is not dilated sufficiently to prevent an equally easy and speedy delivery by this way. The classic section is preferred for these cases. In placenta previa, abdominal operation is indicated in cases where hemorrhage appears to threaten the mother before the cervix is sufficiently dilated for version or other interference. In these cases the operation is performed in the interest of the mother. The author believes that more cesarean sections should be performed for placenta previa.

J. P. GREENHILL.

Esmann, V.: The Place of Cesarean Section in Obstetrics. Acta Gynecologica Scandinavica, 1923, ii, 241.

Cesarean section is not natural obstetrics and in spite of its good prognosis, its indications should not be extended to include conditions which can be treated by other means with good results to both mother and child. Such an extended indication is habitual death of the fetus during the last few weeks of pregnancy, for one can induce labor prematurely and secure living children.

A deformed pelvis which offers a real barrier is an indication for cesarean, but in cases of contracted pelvis where the shape of the pelvis is normal and cephalopelvic disproportion will most likely exist at term, labor should be induced prematurely. There is no good ground for permitting these patients to go to term in the hope that they will deliver spontaneously and perform a cesarean section only when one realizes that delivery by the natural passages is impossible.

Cesarean section is useful in such complications as eclampsia, placenta previa and abruptio placentae, but the field for the operation should be extended no further than is absolutely necessary. During the last few years in a series of 23 patients who had contracted pelves, labor was induced prematurely and only one child was born dead.

J. P. GREENHILL.

Newell, Quitman U.: Cesarean Section. Journal Missouri State Medical Association, 1924, xxi, 269.

The indications for cesarean section in the writer's opinion are: (1) Contracted pelvis; (2) myoma, large cysts, obstructive growths; (3) carcinoma of cervix; (4) malignancy of bladder and rectum; (5) placenta previa centralis; (6) old primiparae; (7) eclampsia, only in elderly primiparae; (8) extensive scar tissue about cervix and vagina in multiparae.

The elective time for operation is before or at the onset of labor, the indication having been determined beforehand.

Of the types of operation, the conservative cesarean section is suitable in most cases. The other types have their adherents and are of value in selected cases.

F. J. SOUBA.

Portes, L.: Cesarean Section After Exteriorization and Secondary Replacement of the Uterus. Bulletin de la Société d'Obstétrique et de Gynécologie, 1924, xiii, 171.

A secundipara was admitted to the hospital at term because of rupture of the bag of waters. Pains did not begin until four days later and at this time the temperature was 100.4° The next day the liquor amnii had a fetid odor, the fetal head was still above the symphysis and the cervix was dilated about 3 cm. The temperature was 100.8° and the pulse about 160. It was decided to empty the uterus and this was accomplished as follows: Under ether a median supra- and infraumbilical incision was made and the uterus eventrated. There was a marked contraction ring about the baby's neck and the lower uterine segment was very pale. The abdominal wall was sutured to the uterine wall and the uterus incised on the anterior surface. After removing the fetus and placenta the decidua in the lower uterine segment was found to have a diphtheroid appearance. This was swabbed with iodine. The uterine incision was sutured with 8 silk sutures, cleaned with ether and left exposed outside of the abdomen. The first 3 or 4 days after the operation were stormy. The uterus was permitted to remain outside of the abdomen for 34 days, and daily dressings revealed the fact that exteriorization did not greatly retard involution, for on the fifteenth day the uterus was the size of an orange. The lochia were normal. Around the stitch holes in the uterus, however, pus formed and these pus pockets soon ran together. On the twentieth day a secondary suture of the uterine wall with catgut was done. The infection had extended down to, but not through, the uterine mucosa. This secondary suture healed readily.

On the thirty-fourth day after operation the uterus showed no trace of infection, and it was replaced in the pelvis without any difficulty, for there were no adhesions. The patient left the hospital fifty-one days after the first operation and at that time the uterus was freely movable.

J. P. GREENHILL.

Planell, D. Augusti: Clinical Study of the Portes Cesarean Section. Revista Medica de Barcelona, 1925, iii, 501.

The technic of the Portes operation is not complicated. The abdomen is opened as in the classic cesarean section, and the uterus is lifted outside the abdominal wall. The parietal peritoneum is sutured tightly about that part of the uterus which lies in the abdominal incision, and the abdominal wall is closed. Care is taken to close the most inferior portion of the abdominal incision tightly, consuming as little time as possible in doing this, because, in a uterus which has been drawn outside of the abdominal cavity and which is in a condition of anteversion, there is danger of compressing the fetal placental circulation, an act which might result in the death of the fetus.

Immediately after closing the abdominal incision the uterus is covered with towels or gauze and is incised as in a classic cesarean. Fetus and placenta are removed and the uterine incision is sutured. The uterus should then be washed with ether and covered with gauze saturated with warm lactic or acetic acid solution.

The patient is watched very carefully during the first fifteen days of the puerperium for edema of the extremities, edema of the adnexa, and for any phlebitis. When the uterine infection has disappeared the uterine incision, if necessary, is resutured, and the uterus is replaced in the abdominal cavity.

In replacing the uterus it is necessary first to break up any adhesions that may have formed between the uterus and the abdominal wall. This can be done with the fingers.

The author states that this operation is of great value in those cases where there is evidence of an overwhelming infection, because by this method the uterus can be spared, a secondary suture of the uterine wall is possible, and the infection is kept from the peritoneal cavity.

J. M. PIERCE.

### Fournier, C.: Enucleation of the Ovum in the Cesarean Operation. Presse Médicale, April 3, 1926, p. 421.

After a considerable experience with cesarean section, having performed the operation 400 times, the author has now developed a method of removing fetus, placenta and membranes intact in one mass, the opening of the membranes and the removal of the fetus therefrom being performed by an assistant at another table. He has followed this technic in sixty cases. The operation should be performed as near term as possible, before labor has begun.

The procedure is as follows: (1) Incision 18 cm. long, followed by exteriorization of the uterus, temporary closure of the incision with clamps behind the uterus; (2) incision of the uterus and enucleation of the evum intact.

The location of the placenta is determined at the first cut into the uterine wall, as blood escapes freely and in jets if the placenta is anteriorly placed. When the placenta is on the posterior wall the incision in the uterus (18 cm. long) is carried carefully down until the membranes are exposed for three or four cm. The seissors are now used and the incision is completed to its full length. The open hand is introduced and the membranes are separated from the uterine wall. The most convenient hand is then introduced into the uterus toward the pelvis behind and even below the lower pole of the fetus, pressure is made from below upwards, and the ovum is expressed intact. At times it is necessary to retract the lips of the wound posteriorly and to press lightly upon the posterior uterine wall. If the placenta is on the anterior wall, it is detached first, and then the above precedure is employed. An iodized compress is introduced from above downward into the cervix and the operation completed as usual.

There is no hurry about opening the membranes; the author thinks that the child cries more readily if at least one minute clapses before this is done. There is no bleeding from the placenta during this time. All the children delivered in this manner have been born alive.

The operation is simple, clean (no spilling of possibly infected amniotic fluid), and "elegant." The author feels that this method should be employed whenever possible, and that the low section is only exceptionally indicated. This new technic is, of course, not available when the membranes have already been ruptured at the onset of labor.

E. L. King.

### Fleurent, M.: The Low Cesarean Section. Bulletin d'Obstétrique et de Gynécologie, 1925, xiv, 615.

Fleurent reports ten of these operations which he performed in the last three years. Of these patients four were "clean" and six were "unclean." All four in the former group recovered. In two of the latter group, forceps had been attempted before operation. In five cases there was bony dystocia and in the sixth

an ovarian cyst. All the children left the hospital in good condition, but one mother died. Autopsy revealed purulent peritonitis which had its origin in the uterine incision. The entire wound had been opened by a collection of pus.

J. P. GREENHILL.

Brindeau, A.: The Low Transperitoneal Cesarean Section. Bulletin de la Société d'Obstétrique et de Gynécologie, 1926, xv, 162.

In 1923 Brindeau performed twenty-one low cervical operations with a mortality of 18.04 per cent; all these cases were infected. Since April, 1924, he has performed eighty-eight low cervical cesarean sections with only one death (1.1 per cent). He feels that the low operation even in clean cases is superior to the classic operation. After this operation one seldom finds secondary peritonitis, adhesions, fistulae, and rupture of the wound, complications with which one must reckon in choosing the classic operation. Nearly all the operations were performed under spinal anesthesia. There are certain dangers in this form of anesthesia, however, for among 231 spinal anesthesias in pregnant women there were two deaths.

J. P. GREENHILL,

Portes and Risacher: The Low Transperitoneal Cesarean Section. Bulletin de la Société d'Obstétrique et de Gynécologie, 1926, xv, 275.

Among twenty-eight cervical cesarean sections performed for cephalopelvic disproportion, twenty-two were done under general anesthesia and six under spinal. The cases were divided into three groups. In the first or noninfected group, of which there were six cases, the convalescence was perfect. In the second or "suspect" groups, of which there were nineteen cases, there were three cases of prolonged fever and one patient died of postoperative peritonitis. The third group consisted of a single definitely infected case which ended in recovery.

J. P. GREENHILL.

Couvelaire and Portes: Concerning the Low Transperitoneal Cesarean Section.

Bulletin de la Société d'Obstétrique et de Gynécologie, 1925, xiv, 647.

The authors have performed the low or cervical cesarean section thirty times in both clean and unclean cases. Ether was used fifteen times, chloroform seven times, and spinal anesthesia eight times. There was one death, but this could not be attributed to the operation. The authors believe that the cervical operation is more difficult to do but at the same time is more satisfactory than the classic operation, because the suturing is done in the noncontractile portion of the uterus and will not be subjected to the powerful uterine contractions which sutures in the body of the uterus must withstand. Convalescence is much smoother than after the classic operation and the cervical operation is less dangerous in the cases where the uterine contents are not absolutely sterile.

J. P. GREENHILL.

Cathala, V.: The Value of the Low Transperitoneal Cesarean Section. Bulletin de la Société d'Obstétrique et de Gynécologie, 1926, xv, 37.

The author has performed three low or cervical cesarean sections and objects to the operation on the following grounds: The operation is performed with the patient in a sloping position and the liquor amnii hides the field of operation. The lower uterine segment hugs the baby's head tightly, especially when the membranes are ruptured. This necessitates great care to avoid injuring the child and may

ere rus is

ay ith

sse

us, the ole. ned

the all,

ri-

ied ors is ost and

the olaure the

the is

d), ever nie the

oloiree

our een xth result in hemorrhage. The extraction of the fetus is difficult. In case of hemorrhage it is easier to control it in the classic operation than in the cervical. The claim that there is less risk of infection of the peritoneum in cases of infected liquor has not been demonstrated. The uterine wound in the lower uterine segment is not stronger but weaker than the wound in the fundus of the uterus. In clean cases the classic operation is superior to the cervical, whereas in unclean cases they have equal value. In frankly infected cases hysterectomy or exteriorization of the uterus should be done. In a series of 110 classic operations the author had three maternal deaths (2.7 per cent), one from shock and two from peritonitis.

J. P. GREENHILL

#### Kakuschkin, N.: Sectio Cesarea Vaginalis Vera. Monatsschrift f ür Geburtshilfe und Gyn äkologie, 1925, lxviii, 101.

Objection has been made to the term vaginal cesarean section because there is not only no analogy in the indication between the abdominal and the vaginal cesarean section but also because the technics are different. In the vaginal operation the incision is made in the cervix while in the classic (abdominal) cesarean section the cervix is not incised. The author believes it is harmful to incise the cervix in doing a vaginal cesarean section and he, therefore, incises the uterine body through the vagina without splitting the cervix. To do this the peritoneum is cut first. After removing the fetus and the placenta the author curettes out the decidua. Three cases are reported. At the time of operation the first patient was three months pregnant, the second was six months pregnant and the third was in the fifth month of pregnancy. All were multiparae and in all the abortions were done for social reasons.

The advantages of this operation are easy, and quick access is had to the interior of the uterus and the visibility of the uterine cavity. As the vaginal cesarean section is ordinarily done there is difficulty in inserting the finger through the internal os and one works in the dark. The second advantage is the very small amount of traumatism which accompanies the new operation. After the old operation there is usually an ugly sear.

J. P. GREENHILL.

### Küstner: Are Cesarean Section Children Apneic or Asphyxiated? Zeitschrift für Geburtshilfe und Gynäkologie, 1925, Ixxxv, 567.

The author attempted to determine by animal experimentation how much the diminished inspiratory excitability so often seen after cesarean section was due to the anesthetic, and how much to some influence of the operation itself. He found that animals delivered without narcosis breathed immediately and regularly and showed evidence of good tone of the voluntary musculature. In cases where the mother was deeply anesthetized, even though only for a short time, respiration was established with difficulty or not at all and the general picture was one of extreme apathy; the lungs on postmortem examination showed lack of proper inflation. This condition the author considers to be an asphyxia caused by the narcosis, and it is in many ways similar to the state induced by an overdose of anesthetic in an adult. Children delivered under anesthesia for fetal causes rarely show this state, since the condition necessitating such delivery is usually one which disturbs the placental interchange and hence interferes with the passage of anesthetic, as well as of oxygen, to the child, thus allowing the accumulation of CO, which acts as an efficient respiratory stimulant. Furthermore, the cerebral pressure on the child during the pains seems to increase the excitability of the respiratory center.

The cesarean section child receives so much oxygen from the mother and its blood

contains so little CO<sub>2</sub> that it need not breathe, that is, it is born in a state of apnea. Oxygen is very rapidly used up in the first few moments after birth, however, and CO<sub>2</sub> is produced by the heart activity, loss of body heat, etc.; hence, unless its respiratory excitability is too much depressed by the narcosis, the child will breathe very shortly. If it does not breathe, it passes quickly into a state of asphyxia from which it may be rescued only by vigorous artificial respiration and the administration of oxygen.

MARGARET SCHULZ.

# Müller, P.: Spontaneous Rupture in the Scar after a Transperitoneal Cervical Cesarean Section Done for Placenta Previa. Monatsschrift für Geburtshilfe und Gynäkologie, 1925, lxx, 249.

In April, 1922, Hüssey performed a transperitoneal cervical cesarean section for placenta previa in a patient's home. The conditions were very unfavorable. The operation was performed on a bed, the light was poor, and the only assistant was a nurse. The family physician administered the anesthetic. Severe bleeding occurred after closure of the uterus, and after the operation the patient had an infection and a double femoral thrombosis. This patient then became pregnant again in September, 1923. On June 14, 1924, she had uterine contractions, but the midwife in attendance found the cervix closed. Pains recurred on the sixteenth and nineteenth of June. On June 20 the patient was taken to a hospital because she had a severe hemorrhage. A diagnosis of premature separation of the placenta was made and laparotomy performed. A rupture 10 to 12 cm. long was seen in the lower uterine segment where the incision had been made in the first operation. The dead child which was still within the uterus was delivered and a Porro operation performed. The author believes that when a cervical cesarean section is done in a case of placenta previa the scar becomes a locus minoris resistentiae in subsequent pregnancies. The scar in this case, however, showed nothing abnormal upon micro scopic examination. J. P. GREENHILL.

#### Wetterwald, Max: Uterine Rupture Following Low Cervical Abdominal Cesarean Section. Zentralblatt für Gynäkologie, 1926, 1, 592.

Of a total of 201 cervical transperitoneal cesarean sections, in 100 instances simultaneous sterilization was performed; in the remaining 101 cases nothing was done to impair or prevent further pregnancies. Of these 45 went through one or more subsequent full-term deliveries. Low cervical abdominal section had to be repeated in eleven, in the majority of these no trace of an old scar could be seen. Adhesions were not found. The remaining twenty-six patients were delivered per vias naturales of forty children. One patient went through six subsequent spontaneous deliveries, another through four, two through three, two through two subsequent deliveries without disturbance. Eight of the subsequent spontaneous deliveries occurred within fifteen months after the first cesarean. Uterine rupture at the end of the second stage of a full-term labor, five years after the first cesarean, occurred in one instance. The writer points out that rupture is apt to occur when the placenta is inserted over the old sear. Cervical incision should be avoided in cases of placenta previa. A compilation of 3,000 cervical cesarean sections performed in sixty-one large clinics in the world is presented, showing that only ten uterine ruptures so far have been recorded. This very low percentage proves the superiority of the low cervical over the old classic incision. Factors which increase the danger of a uterine rupture are: Poor suturing of the uterine wound, infection of the wound, extension of the incision into the uterine muscle above the cervix, intrauterine manipulations for the purpose of terminating labor and placenta previa in a subsequent pregnancy. GROVER LIESE.

ilfe

m-

The

ted

ent

an

hey

the

ree

is esaion ion in in

the

rst.

rior secrnal of e is

für

the e to und and the was eme

and an ate, the well

an hild

lood

Weymeersch and Keiffer: Rupture During Labor of an Old Cesarean Scar. Bruxélles Medical, 1925, xxxii, 1039.

These authors report the case of a woman thirty-two years of age, who had undergone a cesarean section nine years previously. Examination of the existing pregnancy near term revealed no pathology other than slight contraction of the pelvic outlet. Four days before the expected date of confinement the patient hegan to experience slight contractions. Abdominal examination the following morning gave the impression that the uterine wall was extremely thin. Vaginal examination showed the head, which previously had been engaged, to be floating above the superior strait, and there was some dark colored blood in the vagina. The patient's general condition was normal, but the fetal heart could not be heard. Because it was felt that either rupture had taken place or that the uterine wall had become extremely thinned out it was decided to open the abdomen. On incising the peritoneum the fetus, contained within the membranes, was found to have been extruded from the uterus, but still attached to the latter by the placenta. The sac was incised and a fetus which had been dead about forty-eight hours removed. The area of rupture was so extensive that it was decided to do a supravaginal hysterectomy. THEODORE W. ADAMS.

Andérodias and Balard: Obstetric History of a Woman Who Had Eight Pregnancies after a Cesarean Section. Bulletin de la Société d'Obstétrique et de Gynécologie, 1926, xv, 50.

The authors give in detail the history of eight pregnancies which followed a cesarean section. Four of the pregnancies ended prematurely, but this case well illustrates that cesarean section does not necessarily limit fecundity. The uterine scar was evidently very strong, because in the last delivery the child was extracted with a cranioclast after forceps had failed. The dystocia was caused by a contraction ring in the body of the uterus.

J. P. GREENHILL.

### Tofte, A.: Delivery per Vias Naturales in Women Who Have Previously Been Delivered by Cesarean Section. Acta Gynecologica Scandinavica, 1922, i, 403.

The author reports five eases in which delivery took place through the vagina after previous cesarean section. From these cases and from the reports in the literature, he concludes that if the indication for the first cesarean section is no longer present one should give the patient a test of labor; for experience shows that most women deliver from below without trouble. The scar in the uterus frequently shows a great deal of resistance as indicated by subsequent repeated pregnancies in the same patient or difficult labors. In one case twins were delivered after cesarean section and in another version and extraction were performed, and in neither case did the uterine sear weaken. Spontaneous delivery in a patient who has previously had abdominal section does not mean that a rupture may not occur in the third or a subsequent labor.

All women who become pregnant after a cesarean must be watched carefully during pregnancy. During labor preparations must be made for operation which must be performed immediately upon the slightest suspicion of rupture of the uterus. Experience shows that only a small number of women who have cesarean section ever become pregnant again. This the author attributes to the fear of another abdominal operation rather than to the displacement of the adnexa which some authors believe to be the cause.

J. P. Greenhilla

Thorne: Normal Delivery After Traumatic Rupture of Uterus. British Medical Journal, 1921, No. 3143, p. 459.

The author reports an interesting case of traumatic rupture of the uterus occurring in a woman about five months pregnant. She was operated upon about fifteen hours after the accident. The woman became pregnant about nineteen months later and was delivered after normal labor at full term with no complications except a fairly severe postpartum hemorrhage.

F. L. ADAIR.

James, Mary Latimer: Report of Case with Unusual Indication for Cesarean Section. The China Medical Journal, 1925, xxxix, 498.

The author reports a case of a primipara, aged twenty-four years, whose thighs were bound closely together by a very dense, gristly cicatrix, continuous anteriorly with the skin of abdominal wall with not even a pin point aperature. The deformity was the result of a burn suffered at least ten years previously. Posteriorly the trouble had not extended to the buttocks and perineum, nor had it involved the posterior portion of the labia. The thighs could not be separated sufficiently to permit passage of even a moderate-sized infant.

Cesarean section was done at term and a male infant of 6 pounds  $2\frac{1}{2}$  oz. was delivered.

One month after delivery, a plastic operation was done on the thighs and the anterior portion of the vulva was built up. Convalescence from this second operation was prolonged and she developed tertian malaria, necessitating intramuscular injections of quinine to control it.

On leaving the hospital she was able to walk like a normal individual. Condition of the vagina and vulva were such that it seemed she should give birth to future children in the normal way.

FREDERIC J. SOUBA.

Kickham: Uterus Septus Duplex. Surgery, Gynecology and Obstetries, 1922, xxxv, 443.

Kickham performed cesarean section on a woman at term on account of toxemia. He found a double uterus divided by a septum one-half inch in thickness. In each cavity was a live female child, one weighing 6, the other 67/8 pounds.

R. E. Wobus.

#### Forceps Extraction

Gamper, A.: The Frequency of Forceps Operation and Fetal Mortality.

Monatsschrift für Geburtshilfe und Gynäkologie, 1923, lxiv, 297.

Among 5,505 labors there was a fetal mortality of 3.6 per cent up to twenty-four hours postpartum. Of these, 1.1 per cent died before labor, 1.9 per cent during labor, and 0.6 per cent after labor. The frequency of forceps operation in the entire series was 2.1 per cent. In general, forceps were not applied until six or eight hours after complete dilation of the cervix and two hours after the head was visible. The forceps was the last resort after all other means had failed. For the forceps cases the fetal mortality was 4.3 per cent, which was not much higher than the total fetal mortality (3.6 per cent).

The author attempts to explain the relation between cerebral hemorrhages and the application of forceps. Intracranial hemorrhage is due to three factors: (1) venous stasis; (2) compression of the head and marked overlapping of the skull

had ting the

car.

inal ing ina.

be rine On

nta.

ora-

eg-

l a well rine

een

011-

ina the no

ted red and ent

not

fre-

illy ich the

of ich bones during labor, especially during the rapid extraction of the after-coming head, and (3) laceration of tissue with or without a special predisposition. Venous stasis is the most important predisposing factor and this increases with the duration of labor. It is, therefore, conceivable that the disturbances in the central nervous system due to intracranial and intracerebral hemorrhage can be avoided by timely delivery with forceps. If interference is delayed a long time irreparable damage to the nervous system may result before the forceps are applied; or vessels which are dilated to a maximum degree from long-continued stasis are ruptured by even gentle compression of the forceps. Such fetal deaths are not attributable to the forceps but to the obstetrician.

J. P. Greenhill.

Rittershaus, G.: Frequency of Forceps and Fetal Mortality. Monatsschrift für Geburtshilfe und Gynäkologie, 1925, lxix, 182.

Among 17,942 women at the Freiburg Clinic, 1,491 (8.32 per cent) were delivered with forceps. The latter were applied in the interest of the child more than twice as often as in the interest of the mother. The total fetal mortality was 3.78 per cent, but among the 678 deaths there were eighty-three macerated babies and 138 children had died before the mothers were admitted to the hospital.

The indications for forceps delivery on the part of the mother are uterine atony, a second stage of four hours, threatened infection, fever, acute infections and heart failures. On the part of the child, the indication for interference is a heart rate of less than 100 during a pause between uterine contractions. Since instituting the four-hour rule for the second stage (1918), the number of forceps deliveries has increased, but the fetal mortality has decreased. There was no increase in maternal mortality or morbidity. In the Freiburg Clinic it has been shown that the dangers of the second stage of labor are greater than those of the first stage and also that the delay in expulsion of the child after a few hours endangers the child.

J. P. GREENHILL.

Berkeley: The Use and Abuse of Obstetric Forceps. The Journal of Obstetries and Gynaecology of the British Empire, 1923, xxx, 413.

Forceps are too frequently used because of inaccurate observation and diagnosis, and in the face of little or no knowledge of the mechanism and stages of labor.

The use of forceps except as tractors is seldom justified. Manual rotation of the head in posterior positions usually makes instrumentation unnecessary for this part of the mechanism. Haste in extraction is damaging and almost never necessary. When great force had to be used in delivery forceps extraction was not the correct procedure for the case. While extraction diminishes suffering during labor, the increased risk and the possibility of lifelong suffering from injury and infection rules out instrumentation for the relief of pain. Before using forceps the practitioner should ascertain the relative size of the pelvis and head, the condition of the genital canal, the strength of the contractions and the condition of the fetus. There is no definite time limit for delivery, and, the mother and baby being in good condition, a lingering second stage is less harmful than rapid delivery. Eighty per cent of border line cases of disproportion deliver spontaneously. High forceps delivery is rapidly being recognized as an abuse, not an aid to the obstetric art. At best only a small percentage of babies can be delivered alive in such cases, irreparable damage is done the mother, and, where delivery is not effected, cesarean section is no longer safe.

Forceps were employed 1,336 times in 17,738 deliveries (7.7 per cent) at the London Maternity Hospital. Fourteen maternal deaths occurred in the 1,336

ead

10119

ura-

tral

ded

able

sels

ible

für

liv-

ian

.78

ind

ny,

ind

art ut-

liv-

986

hat

ind

ld.

ies

sis,

of

118

es-

he

ng

nd

DS

di-

he

by

V-

v.

he

in ot 0

cases. Seventy-two infants died during or immediately following labor; thirteen died later. In 7.5 per cent of cases babies were born in asphyxia from which 18 per cent died. Facial paralysis occurred in 3.5 per cent of cass, Erb's paralysis in 0.5 per cent. The indication for delivery was prolonged second stage in 1,041 cases. Fourteen babies died and 11 were injured in forty-nine cases where forceps were applied for arrest in or above the pelvic brim. Eleven babies died and seventeen were injured in 218 cases of arrest below the brim. Eighty-two per cent of the babies were born dead or died where attempts at forceps delivery before admission had failed. Fever followed the application of forceps in thirty per cent of the cases and was severe in half that number.

H. W. Shutter.

Shannon: The Failed Forceps Case and Its Treatment. Transactions of the Edinburg Obstetrical Society, Session lxxxii, p. 120.

The term "failed forceps" is applied to cases where attempts at extraction with instruments have failed. In 2,720 obstetric cases seen by the author and his staff, seventy or 2.6 per cent came in this category. Fifty-two per cent were due to pelvic contractions. In most of these the obstetric history and degree of contraction should have warned the practitioner before the onset of labor. Occiput posterior position of the vertex was the second most common cause of failure. Errors of flexion, unusually large fetuses and contraction ring dystocia accounted for from ten to twelve per cent of cases. In several cases no cause for either the application or failure of forceps could be found, the women later delivering spontaneously.

Five mothers (7 per cent) died in the puerperium, one of shock and four of infection. Fifty per cent of women developed temperature in the puerperium. Invalidism, continued ill health, ruptured uterus (2 cases), fistulae, rupture of the symphysis pubis (2 cases) and even insanity were some of the sequelae in the author's cases. Sixty per cent of the infants were stillborn and many died later.

The difficulties of these cases come more from the faulty judgment of the men handling them than from the conditions themselves. In the hands of competent men the treatment would have been clean cut. Once interference has failed the question to determine is: Can delivery be effected from below? Frequently it can and is effected spontaneously. In some cases the second forceps application is successful. Occasionally cases must be treated medically before interference can be attempted. Experience shows pubiotomy unsuitable in these cases; the morbidity and mortality equal that following cesarean section. Where posterior position of the occiput is delaying engagement it might be wise to rotate the occiput anteriorly and apply forceps when the emergency demands. Where forceps have been applied to a brow presentation the author delivers by version if the child is still alive, otherwise by craniotomy. Gentle traction with the forceps is tried where morphine and anesthesia will not relieve contraction ring dystocia.

In cases where examination shows delivery from below impossible treatment lies between cesarean section and eraniotomy. In the potentially infected case, particularly in the presence of cervical and vaginal lacerations the author prefers craniotomy to the increased maternal risks of cesarean section. Cesarean hysterectomy does not improve the outcome in these cases. When the baby is dead or in a dying condition eraniotomy is indicated.

H. W. Shutter.

Phillips: An Address on the Failed Forceps Case. The Lancet, 1926, eex, 113.

If forceps fail to effect delivery, either because they slip or because no progress is made in spite of strong traction, examinations with special attention to the

following points should be made: The general condition of the patient; the abdomen, including pelvic measurements and notation as to the position of the head in relation to the pelvic brim; the condition of the child, particularly the position of the occiput; the vagina, the presence of lacerations; edema of the perineum, vulva, or vagina; the existence of a tumor in the pelvis.

The author points out that the more prominent causes for failed forceps are: unrotated or partially rotated occipitoposterior positions, a contraction ring around the neck of the child, pelvic tumors, and contracted pelves.

The treatment of each of these conditions is then discussed by the author. He emphasizes the importance of recognizing posterior positions, and where early rupture of the membrane has taken place or where the patient is very fat or nervous and position is unsatisfactorily made out the use of vaginal examination is encouraged. It is wise to pass the whole hand into the vagina over the fetal head until the face or neck is reached, thus noting exactly the position of the occiput.

Contraction ring cases should be treated by small doses of morphia.

Pelvie tumors complicating labor are not common.

When the forceps fail to deliver a head in the pelvic cavity, it is doubtful whether any advantage is to be gained by version, while in many cases in which the head cannot be pushed up easily, the practice is fraught with considerable danger, especially the risk of rupture of the uterus.

In extreme degrees of pelvic contraction, cesarean section is the only rational treatment, irrespective of the duration of labor. Similarly in moderate degrees of contraction when the child is dead perforation is recognized as the correct treatment, if forceps fail and version is contraindicted. In cases of moderate contraction in which forceps have failed and the child is still alive, there is a choice between cesarean section and perforation of the living child. The tendency today is to extend the scope of cesarean section to these cases, irrespective of the addedrisk to the mother. The author believes that proper antenatal supervision, ending in induction of labor some time between the thirty-sixth and thirty-eighth week of gestation is very important in the prevention of failed forceps and difficult forceps.

Norman F. Miller.

#### Das, K. N.: The Bengal Forceps. The Indian Medical Gazette, 1923, lviii, 22.

The average measurements of the pelvis in Bengali women are about %ths of those of British women. The average weight of a Bengali full-term baby is about six-sevenths the average weight of a British baby; while the size of the head of the former is proportionately smaller. British foreeps frequently cause injuries to the mother.

The ordinary Simpson forceps were modified making them lighter and more delicate, weighing one pound. The pelvic curves were made a little more pronounced and the distance between the shanks near the joint wide enough to admit the forefinger. These special forceps are found suitable for Indian women generally.

F. J. Soura.

#### Hernstein, A.: The Results of the High Naegele and Kielland Forceps. Monatsschrift für Geburtshilfe und Gynäkologie, 1923, lxii, 139.

The results of eighty-five high Naegele and forty-three Kielland forceps operations were studied by the author.

For the Naegele operations there was a maternal mortality of 3.52 per cent. The extensive injuries were as follows: Four complete perincal lacerations, eight

deep vaginal tears, five extensive cervical lacerations and six bladder injuries of which five resulted in urethral fistulae. Only sixty-one out of the eighty-five children remained alive.

Of the forty-three Kielland forceps operations, one mother died (from cardiac decompensation). The extensive injuries were as follows: Two complete perineal lacerations, three deep vaginal tears, two extensive cervical lacerations, and one bladder fistula. Seven of the forty-three babies died.

The author concludes that the Kielland are better than the Naegele forceps where the head remains high in the pelvis, because traction and hence delivery require less force. We should not, however, be overenthusiastic about the Kielland forceps. Because of the difficulty in applying the blades; an accurate diagnosis must be made and much obstetric knowledge and experience are essential. The use of the Kielland forceps does not justify an extension of the indications for high forceps.

J. P. GREENHILL.

Schubert: Experiences with the Kielland Forceps. Zeitschrift für Geburtshilfe und Gynäkologie, 1923, lxxxvi, 134.

The author's experience with the Kielland forceps comprises thirty cases, with a fetal mortality of 0, including five high forceps, one face presentation, one brow and ten cases of deep transverse arrest. From this experience, he concludes that, used as high forceps, the Kielland is markedly preferable to the Tarnier instrument. In definitely contracted pelves, it cannot make delivery by the natural passages possible any more than can the Tarnier instrument and, therefore, could never, even in a single case, avoid a definitely indicated cesarean section. In cases of mild disproportion between head and pelvis, it may not be possible to deliver more children than with the Tarnier forceps, but they can be delivered much more easily and with less damage.

In all atypical presentations, as face, brow, occiput posterior, deep transverse arrest, and in fact in all cases where complicated movements must be made of the child's head within the pelvis, the Kielland forceps are markedly preferable to the classical forceps.

For ordinary low forceps operations, they are at least as good as the classical forceps. In any case, therefore, where the definite indications for a forceps operation are present, the Kielland instrument may be depended upon to perform it with the minimum of trauma for both mother and child.

MARGARET SCHULZE.

#### Horn, O.: The Kielland Forceps. Acta Gynecologica Scandinavica, 1923, ii, 322.

In a series of seventy cases delivered with the Kielland forceps there was one maternal death, and this was due to pulmonary embolism on the fourteenth day. No mother suffered a marked laceration. Of the seventy children, six were born dead, but three of these were dead before the application of the forceps. None of the other three deaths could be ascribed to the forceps.

The use of the Kielland forceps demands an exact knowledge of diagnosis and more experience than use of the axistraction forceps.

J. P. GREENHILL.

Eisenberg, C.: Experiences with the Kielland Forceps. Medizinische Klinik, 1924, xx, 1694.

The author reviews the histories of seventy patients who were delivered with the Kielland forceps. In four cases the head was above the inlet, in fifty-six in the middle of the pelvis and in ten on the perineum. In twenty cases the cervix was

head sition neum,

are:

; the

He rup-

s enhead ut.

btful
the
nger,
ional

reattracbeoday Ided ding

eult

e of oout the

ore oromit cen-

ra-

nt. ght not fully dilated and in six instances incisions had to be made in the cervix. Four of the mothers died, three of sepsis and one of peritonitis after a laparotomy. The severe maternal injuries were a vesicovaginal fistula which was diagnosed before the application of the forceps and a cervical laceration which required repair. In not one case was there a third degree laceration. Ten babies died, of which four were stillborn; one died intrapartum; two had tentorial lacerations; one had syphilis; one had a craniotomy, and one had a skull fracture from forceps which had been applied before the patient was admitted to the hospital. In the majority of the cases the anterior blade was inserted into place by making it wander. In four cases the Kielland forceps were successful where the Naegele had failed. The author feels that the Kielland forceps is superior to all other types of forceps. It not only replaces the classic type of forceps but also extends the use of forceps so that mothers and infants may be saved in certain cases where the Naegele forceps are unsuccessful.

J. P. Greenhull.

### Henkel, M.: Is the Kielland Forceps a Universal Instrument for the General Practitioner? Medizinische Klinik, 1924, xx, 71.

In the Jena Clinic the incidence of forceps deliveries for the past 14 years was 4.5 per cent, for which the fetal mortality was 7.7 per cent. When labor comes to a standstill due to uterine atony, forceps are not used but pituitary preparations are employed. In other cases episiotomy makes the use of forceps unnecessary.

The most frequent indication for forceps delivery is fetal asphyxia. In these cases delivery must be accomplished quickly and without damage and this is accomplished with the Naegele forceps if the fetal head is in the pelvic cavity. Where the head is high, however, and particularly if the head is not fixed and not moulded, the Kielland forceps give better results.

The insertion of the anterior blade as advocated by Kielland is dangerous, as shown by such conditions as rupture of the uterus and injury to the umbilical cord. In cases of contracted pelves where the head is high the results with the Kielland forceps are not very satisfactory. The value of these forceps, while a very definite one, is, however, being violated by errors in judgment regarding its use. The new forceps should not be given to the practitioner as a universal instrument.

J. P. GREENHILL.

## Aza, Vital: Should the General Practitioner Use Kielland Forceps? Revista Espanola de Obstetricia y Ginecologia, 1924, ix, 377.

Aza warns against the indiscriminate use of the Kielland forceps by the general practitioner whose knowledge of the instrument has been gained entirely from the reading of the various enthusiastic reports of its use gleaned from the literature (especially German). He calls attention to the fact that the original idea of the inventor was to be able to apply forceps to unengaged heads and through undilated cervices. He warns against the danger of rupture of the lower uterine segment and of trauma to the umbilical cord if the method of application of the anterior blade of the forceps as advocated by Kielland is carried out.

Thos. R. Goethals.

#### Wyder, T.: The Significance of the Kielland Forceps in Obstetric Practice. Schweizerische Medizinische Wochenschrift, 1924, liv, 253.

The author believes that the Kielland forceps, just like the axistraction forceps, will in time lose its popularity. The former, however, is a definite improvement in the construction toward an ideal forceps. There is no doubt that the new forceps

'our

The

the

not

vere

een

the

our

The

It

1 50

eps

eral

was

to

ons

iese

om-

the

the

as

ord.

and nite new

sta

ral

the

ure

the

ted

nd

ide

ce.

ps,

in

ps

with its almost absent pelvic curve is ideal for cases of transverse arrest of the head and in deflection attitudes, such as brow and face presentations, because of its biparietal application. The Kielland forceps even when properly applied has sometimes injured the mother or the baby, but in some of these cases the operators were at fault because the proper conditions were not present for a forceps delivery.

The constant repetition of the ease with which the new forceps can be used might, in the writer's opinion, have a bad influence, for high forceps operations will again become frequent. Most obstetricians, however, feel that the indications for a forceps operation should not be extended by the general practitioner simply because he has the Kielland forceps. As Kielland himself says, the instrument should not be used to overcome bony resistance.

For the specialist the new instrument should supplement but not entirely replace the older types of forceps. It may enable one to avoid an occasional cesarean section or a craniotomy on a living baby. The general practititoner, however, should have only one instrument, an old type, and he should know its limitations.

J. P. GREENHILL.

Heinleinf: Experiences with Kielland Forceps. Zentralblatt f
ür Gyn
äkologie, 1925, l, 1485.

To attempt a forceps where there is a possibility of later cesarean section is taking too great a chance with the mother's life, and likewise version is contraindicated after an attempt at forceps. The writer has made use of the Kielland instrument in some 37 cases with good results for the most part but not invariably. The instrument is not entirely harmless and in three cases there was serious damage to the cervix, though the bladder was not torn. To obtain the good results claimed by the various operators a man must be a Kielland specialist. This forceps cannot be recommended for practitioners.

Nürnberger: Forceps on the After-Coming Head. Monatsschrift für Geburtshilfe und Gynäkologie, 1922, lvii, 305.

There are two ways to account for the deaths of children who are born with the head last; namely, asphyxia and injury (fractures, paralyses and intracranial hemorrhages). For those who died of asphyxia, manual extraction of the head did not help and to those who had injuries, it did harm. Forceps, however, can save babies and are indicated in all cases where the Smellie-Veit or Wiegand-Martin maneuver does not yield results within a reasonable length of time. In all cases where the face is directed anteriorly, no attempt should be made to rotate the face posteriorly but forceps should be applied immediately. The forceps should always be applied under the child. The author is very well satisfied with his results and emphasizes the importance of having the forceps ready for use at every case of breech presentation.

J. P. GREENHILL.

Fink, K.: Kielland Forceps on the Breech. Zentralblatt für Gynäkologie, 1925, 1, 1490.

Fink made use of the Kielland forceps on an impacted breech presentation and was surprised at the remarkable facility of delivery. The child was born dead, but the operation was a remarkable success.

LITTLE.

Hermstein, A.: Forceps Applied to the Breech. Monatsschrift für Geburtshilfe und Gynäkologie, 1925, lxxi, 125.

The author reports four cases of breech presentation which were successfully delivered with forceps. He believes that in a breech presentation when the hips are in the pelvic cavity in such a way that the bisiliac diameter runs transversely, the condition is unphysiologic and as anomalous a position as transverse arrest is in head presentations. In these cases extraction alone will not suffice because rotation of one hip to the front is necessary. For this purpose the Kielland forceps are especially adapted.

J. P. Greenhill.

#### BOOKS RECEIVED

NERVOUS AND MENTAL DISORDERS FROM BIRTH THROUGH ADOLESCENCE. By B. Sachs, consulting neurologist to the Mount Sinai and Montefiore Hospitals, etc. and Louis Hausman, instructor in neuroanatomy, Cornell University Medical College, etc. With 110 illustrations including three full page plates. Paul B. Hoeber, New York, 1926.

ERGEBNISSE DER MEDIZINISCHEN STRAHLENFORSCHUNG. Herausgegeben von H. Hohlfelder, Frankfurt a.M., H. Holthusen, Hamburg, O. Juengling, Tuebingen, und H. Martius, Bonn a.Rh. Band II. Mit 520 teils farbigen Abbildungen im Text und auf 3 photographischen Tafeln. Verlag von Georg Thieme, Leipzig, 1926.

ELECTROTHERMIC METHODS IN THE TREATMENT OF NEOPLASTIC DISEASES. By J. Douglas Morgan, M.D., formerly radiologist, Ross Pavillion, Royal Victoria Hospital, Montreal, etc. etc. Illustrated with 36 line and half-tone engravings. F. A. Davis Company, Philadelphia, 1926.

EVOLUTION AND GENETICS. By Thomas Hunt Morgan, professor of experimental zoology in Columbia University. Princeton University Press, Princeton, 1925.

DER KUENSTLICHE ABORT. Von Professor Dr. G. Winter, em. Direktor der Univ. Frauenklinik in Koenigsberg. Verlag von Ferdinand Enke, Stuttgart, 1926.

EDGAR'S PRACTICE OF OBSTETRICS. Revised by Norris W. Vaux, clinical professor of obstetrics in the Jefferson Medical College, etc. Sixth edition. With 684 illustrations, including 5 colored plates and 38 figures printed in colors. P. Blakiston's Son and Co., Philadelphia, 1926.

INSTRUMENTELLE PERFORATION DES GRAVIDEN UTERUS und ihre Verhuetung. Von Professor H. v. Peham, Vorstand der ersten Univ. Frauenklinik in Wien, und Privatdozent H. Katz, Assistent der ersten Univ. Frauenklinik in Wien. Verlag von Julius Springer, Wien, 1926.

BIOLOGIE UND PATHOLOGIE DES WEIBES. Herausgegeben von Professor Josef Halban in Wien und Professor Ludwig Seitz in Frankfurt a.M. Lieferungen 25 und 26. Urban und Schwarzenberg, Berlin und Wien, 1926.

LEHRBUCH DER STRAHLENTHERAPIE. Band III. Die Strahlentherapie in der inneren Medizin. Herausgegeben von Professor F. Gudzent in Berlin und Professor H. Holthusen in Hamburg. Mit 160 Abbildungen im Text und 6 farbigen Tafeln. Urban und Schwarzenberg, Berlin und Wien, 1926.